

DEPARTMENT OF THE INTERIOR

ANNUAL REPORT

OF THE

TOPOGRAPHICAL SURVEYS
BRANCH

1910-1911

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OTTAWA

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1912

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REPORT

OF THE

SURVEYOR GENERAL OF DOMINION LANDS

1910-1911

DEPARTMENT OF THE INTERIOR,
TOPOGRAPHICAL SURVEYS BRANCH,
OTTAWA, September 6, 1911.

The Deputy Minister of the Interior,
Ottawa.

SIR,—I have the honour to submit the following report of the Topographical Surveys Branch for the year ended March 31, 1911.

During 1910 surveys under the Dominion Lands system were continued in the western provinces under the usual organization. Eighty-eight parties in all were employed, seventy-three of these being regular parties engaged for the season and fifteen being parties organized for special surveys and engaged for short periods only. Of the seventy-three regular parties thirty-nine were employed by the day and thirty-four were working under contract. Those working under contract were engaged exclusively on township subdivision surveys, while, of those employed by the day, five were engaged upon the inspection of surveys executed under contract, eight on base lines and initial meridians and twenty-six on miscellaneous surveys and resurveys.

The weather throughout the season was, on the whole, very favourable for survey operations. In the southerly districts there was an unusually light rainfall but surveyors in outlying districts to the north report that precipitation was ample and that grasses and wild plants, where found, were growing luxuriantly. The amount of work performed by each party during the season compares well with the work of previous years. The following is a statement of the average number of miles of survey per party for the last four seasons :—

1910	279 miles.
1909	412 “
1908	366 “
1907	364 “

The falling off in the mileage for 1910 is accounted for by the fact that during 1907, 1908 and 1909 a large proportion of the surveys were in prairie districts while all the surveys of 1910 were in country more or less wooded.

One hundred and eighty-three whole townships and twenty-three fractional townships were completely subdivided while a partial subdivision was made of four hundred and nine others. Complete resurveys were made of eight townships and a partial resurvey of one hundred and eighty-nine others.

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The survey parties employed during the season were distributed as follows :

PARTIES.	In Man.	In Sask.	In Alta.	In B. C.	Partly in one Province and partly in another.	Total.
Paid by the day.....	1	2	16	10	10	39
Under contract.....	1	12	21	.....	.....	34
Engaged for a short time only .....	.....	5	4	6	.....	15
Total.....	2	19	41	16	10	88

SURVEYS OF BLOCK OUTLINES.

Eight surveyors were employed on the surveys of base lines and initial meridians. These lines are situated in outlying portions of the country out of reach of railway transportation and surveyors as a rule make arrangements to have supplies taken in over the winter roads and cached at convenient points in the vicinity of their work. One of their great difficulties is thus overcome and they can push forward with their work without fear of the failure of their food supply for men and horses. In all about nine hundred and ninety miles of governing lines were surveyed during the year. Each surveyor prepares a sketch map showing the topographical features of the country for twelve miles on each side of the base or initial meridian and a report as to its natural resources, etc. In this way the Department is furnished with much valuable information that cannot be obtained otherwise.

Mr. Wm. Christie, D.L.S., completed the survey of the eighteenth base and established the twentieth base across ranges one to nine inclusive, west of the fourth meridian.

Mr. A. W. Ponton, D.L.S., continued the production of the fifth meridian to the north of township 112 and established the twenty-eighth base westerly therefrom across ranges one to seventeen inclusive, and the twenty-ninth base across range one. He began this survey in the summer of 1909 but was retarded considerably by wet weather and by the loss of his supplies and instruments through an accident on Peace river. He found considerable areas along the meridian and on the twenty-eighth base flooded from the heavy rains which were prevalent in that district. The survey of the twenty-eighth base will enable the Department to subdivide the lands in the vicinity of Vermilion under the Dominion Lands system when the necessity arises. Mr. Ponton reports that the soil there is good and the country well suited for agriculture.

Mr. George McMillan, D.L.S., continued the surveys of the sixteenth, seventeenth and twentieth base lines west of the sixth meridian. He remained in the field during the whole year and is now surveying the base lines and outlines of the block of three and one-half millions of acres conveyed by the province of British Columbia to the Dominion. The base lines already surveyed in this block will allow of the subdivision into townships of the district known as Pouce Coupé prairie.

Mr. A. Saint Cyr, D.L.S., surveyed the third meridian from township 60 to the seventeenth base line and established that base westerly across ranges one to twelve. His report shows that there are large areas of valuable timber in that region and extensive stretches of good farming land. On the north shore of Sled river in township 63, range ten, there is a settlement of half-breeds who have cleared the land and are growing all the ordinary vegetables successfully, as well as hay and oats. Fishing is, however, the great industry at present.

Mr. B. J. Saunders, D.L.S., had instructions to survey the nineteenth base line west of the fourth meridian. Owing to the scarcity of supplies, the extreme cold and

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the great difficulties of making trails he was compelled to abandon the work after the line had been established across five ranges only.

Mr. J. N. Wallace, D.L.S., beginning where he left off in 1909 produced the fourth meridian as far as the northeast corner of section 13, township 95. Mr. Wallace has had many years of experience on the survey of initial meridians and base lines in the western provinces but he states that the difficulties of his surveys of 1910 were greater than any he had ever before encountered. His report which is published as one of the appendices of the report of the Topographical Surveys Branch gives an interesting description of the country through which that portion of the fourth meridian passes. A sketch map of the portion of the fourth meridian surveyed by Mr. Wallace in 1909 was published with the report of the Topographical Surveys Branch last year but as no profile was then ready a sketch map and profile for the whole portion of the line surveyed by Mr. Wallace in both 1909 and 1910 are published with this report.

Mr. A. H. Hawkins, D.L.S., completed the survey of the twenty-first base line west of the fifth meridian. He began at the east boundary of range nineteen and produced the line east as far as the meridian. This base line passes through a fairly level country about sixty per cent of which is fit for agriculture. This percentage can be greatly increased by proper drainage. The soil is good and the surface is covered with a luxuriant growth of grass and pea-vine. All that is necessary to open up this valuable tract of country is railway transportation. Already large gardens are under cultivation at Atekamic and Wabiskaw lakes.

Mr. E. W. Robinson, D.L.S., during the summer of 1910 produced the principal meridian north to lake Winnipeg and established the eighth base east of the principal meridian east to lake Winnipeg and completed the survey of the ninth base west of the principal meridian. The country through which these lines run is mostly swamp and muskeg rendering the surveys very difficult but yet the whole distance of over one hundred miles was completed in six months.

During the winter Mr. Robinson produced the second meridian from township 56 to the sixteenth base and established the fifteenth base west of the principal meridian easterly from the second meridian to range twenty. From this base it will be possible to subdivide into townships under the Dominion Lands system the lands in the vicinity of The Pas as the surveys are required. He reports that at present there is little land in that vicinity fit for cultivation but thinks that, with proper drainage, it will make first-class wheat land.

TOWNSHIP SUBDIVISION SURVEYS.

Where contract rates for township subdivision are not applicable parties under daily pay are employed to make the surveys. During 1910 nine parties were engaged upon these surveys.

Mr. J. R. Akins, D.L.S., subdivided portions of townships twenty-one, twenty-two and twenty-three, range nine, west of the fifth meridian. The object of the subdivision surveys in these townships was to enable the Department to deal with lands covered by applications for coal leases. Before subdivision lines under the Dominion Lands system could be projected into these townships it was first necessary to produce the sixth base line across ranges seven, eight and part of nine from the Elbow to the Kananaskis valley. This was also done by Mr. Akins. The country is very rough and survey operations are carried on under great difficulties. An idea of the accuracy which is obtainable under the present system of making surveys may be gathered from the following statement by Mr. Akins:—

“We at length succeeded in getting both the line and triangulation over into the Kananaskis valley and here we checked our work by measuring the side of a tri-

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angle which had already been calculated and we found that the two checked to about a link."

Messrs. W. A. Scott, D.L.S., and J. L. Lang, D.L.S., carried on subdivision surveys in the foot-hills of the Rocky mountains in the vicinity of Livingstone, Oldman and Southfork rivers. Both parties were greatly handicapped by smoke and fire and were obliged to spend considerable time in assisting the Dominion Fire Rangers in fighting the fires. Mr. Scott during the last part of the season was employed on miscellaneous retracement and traverse surveys in southern Saskatchewan.

Messrs. J. Francis, D.L.S., J. B. McFarlane, D.L.S., O. Rolfson, D.L.S., and A. L. McNaughton, D.L.S., subdivided townships along the Saskatchewan, Brazeau and Pembina rivers in which coal claims are located. The country is very rough and covered with fallen timber which renders survey operations slow.

Mr. A. L. Cumming, D.L.S., was engaged in projecting township subdivision westerly along the line of the Grand Trunk Pacific railway from range twenty-five to the sixth meridian.

Mr. W. A. Ducker, D.L.S., made the necessary surveys of township outlines to define the limits of Porcupine Forest reserve west of the north end of lake Winnipegosis.

CORRECTION, RESTORATION AND MISCELLANEOUS SURVEYS.

Traversing lakes and rivers, correcting errors in previous surveys, retracing erroneous lines and restoring obliterated monuments are some of the miscellaneous surveys which are done by parties under daily pay.

Mr. C. F. Aylsworth, D.L.S., was occupied on resurveys in southeastern Saskatchewan and retracement surveys in Manitoba.

Mr. W. F. O'Hara, D.L.S., resurveyed a number of townships along the international boundary in Alberta. He also subdivided the R.N.W.M.P. reserve at Pincher Creek and made a survey of villa lots at Waterton lakes in townships 1, ranges twenty-nine and thirty, west of the fourth meridian.

Mr. P. A. Carson, D.L.S., was employed on small miscellaneous surveys in southern Saskatchewan and Alberta. His work included the correction of errors in the original subdivision, the reestablishment of lost corners, the traverse of water areas and investigation of dried up lakes and resurveys applied for. In all he completed about fifty separate jobs during the season.

After the close of his operations in the mountains of British Columbia, Mr. M. P. Bridgland, D.L.S., was employed on miscellaneous surveys in Alberta and Saskatchewan, similar to those performed by Mr. Carson.

Messrs. Carl Engler, D.L.S., E. L. Burgess, D.L.S., and F. H. Kitto, D.L.S., all permanent members of the office staff were sent to the field for short periods to make special surveys for the Department.

Mr. Engler determined by latitude observations the position of the northern boundary of Alberta and made a survey of Smith Landing settlement.

Mr. H. W. Selby, D.L.S., made a settlement survey at McMurray and Athabaska Landing and an adjustment of settlers' claims at these places. On his return trip from McMurray Mr. Selby was accidentally drowned in the Athabaska river. He had been connected with Departmental surveys more or less since 1883 and continuously since 1902. He was a devoted public servant and was selected for the difficult task of adjusting claims in these settlements on account of his tact, fidelity and excellent judgment.

Mr. Wm. Ogilvie, D.L.S., surveyed a water-power site for the city of Prince Albert, at Cole falls on Saskatchewan river.

Mr. W. Thibaudeau, C.E., was employed on a reconnaissance of Winnipeg and English rivers to determine the most suitable locations for storage reservoirs for water-power development.

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Other surveyors employed for short periods only on miscellaneous surveys such as small traverses, timber berths, etc., were Messrs. G. B. Bemister, D.L.S., H. P. Keith, D.L.S., H. G. Phillips, D.L.S., W. R. Reilly, D.L.S., J. E. Woods, D.L.S., and H. B. Proudfoot, D.L.S.

BRITISH COLUMBIA SURVEYS.

Eight parties continued the subdivision of Dominion lands in the railway belt, British Columbia. They were in charge of Messrs. J. E. Ross, D.L.S., G.H. Blanchet, D.L.S., D. A. Smith, D.L.S., P. B. Street, D.L.S., W. J. Deans, D.L.S., A. Lighthall, D.L.S., T. H. Plunkett, D.L.S., and L. D. N. Stewart, D.L.S.

Mr. A. W. Johnson, D.L.S., continued a survey of villa lots at Woodhaven on the North Arm of Burrard Inlet.

Messrs. A. J. Campbell, D.L.S., and R. D. McCaw, D.L.S., continued the examination and classification of the vacant lands in the valleys of the railway belt, British Columbia. Mr. Campbell worked in the New Westminster district and had under his direction a sub-party in charge of Mr. G. A. Bennett, D.L.S. Mr. McCaw worked in the Kamloops district and had a sub-party in charge of Mr. A. V. Chase, D.L.S. By the classification the lands are divided into fruit lands, farming lands, grazing lands, timber lands and worthless lands.

Mr. M. P. Bridgland, D.L.S., continued the triangulation survey through the Selkirk mountains which had been begun by Mr. P. A. Carson, D.L.S., in 1908 and 1909.

Mr. E. Bartlett, D.L.S., made an investigation of squatters' claims in the railway belt, British Columbia, in the vicinity of Golden in the Upper Columbia valley.

Messrs. J. H. Brownlee, D.L.S., P. C. Coates, D.L.S., J. A. Kirk, D.L.S., and G. L. Williams, D.L.S., were employed for short periods on the survey of timber berths.

INSPECTION SURVEYS.

The same five parties as in previous years were engaged the greater part of the season on the inspection of surveys made under contract.

Mr. E. W. Hubbell, D.L.S., was again working in the Prince Albert district. In addition to the inspection of the surveys performed under contract in that district he resurveyed two townships near Prince Albert. During the season he travelled with his outfit over 1,500 miles by rail and over 1,000 miles by trail, not including the number of miles travelled daily to and from work.

Mr. P. R. A. Belanger, D.L.S., carried on inspection in eastern Manitoba. For a considerable part of the time he was engaged on small miscellaneous surveys in Manitoba and Alberta, which he completed to the number of forty-five. He also made a survey of Bender settlement in township 19, range one, west of the principal meridian.

Mr. C. F. Miles, D.L.S., inspected the contract surveys in the district north-west of Battleford. He also made a restoration survey of two townships north of Maple Creek and a resurvey of three townships near Prince Albert.

Mr. G. J. Lonergan, D.L.S., in addition to inspection made miscellaneous resurveys and traverses in ten townships as well as a resurvey of lots 1 to 6 Lac la Biche settlement.

Mr. L. E. Fontaine, D.L.S., inspected contract surveys west of Edmonton and performed a small number of miscellaneous surveys in that district.

STATEMENT OF MILEAGE SURVEYED.

The following is a comparison of the mileage surveyed every year since 1908.

NATURE OF SURVEY	April 1, 1908 to March 31, 1909.	April 1, 1909 to March 31, 1910.	April 1, 1910 to March 31, 1911.
	Miles.	Miles.	Miles.
Township outlines....	2,019	2,089	2,376
Section lines.....	16,985	16,326	11,849
Traverse.....	3,323	2,413	2,758
Resurvey.....	2,175	3,876	906
Total for season.....	24,502	24,704	17,889
Number of parties.....	67	60	64
Average miles per party.....	366	412	279

The following tables show the mileage surveyed by the parties under daily pay and by the parties under contract.

WORK OF PARTIES UNDER DAILY PAY.

NATURE OF SURVEY.	April 1, 1908, to March 31, 1909.	April 1, 1909, to March 31, 1910.	April 1, 1910, to March 31, 1911.
	Miles.	Miles.	Miles.
Township outlines..	512	861	1,178
Section lines.....	1,004	1,066	1,487
Traverse.....	1,158	1,324	462
Resurvey.....	2,175	3,808	835
Total for season.....	4,849	7,059	3,962
Number of parties.....	36	34	30
Average miles per party.....	135	208	132

WORK OF PARTIES UNDER CONTRACT.

NATURE OF SURVEY.	April 1, 1908, to March 31, 1909.	April 1, 1909, to March 31, 1910.	April 1, 1910, to March 31, 1911.
	Miles.	Miles.	Miles.
Township outlines.....	1,507	1,228	1,198
Section lines.....	15,981	15,260	10,362
Traverse.....	2,165	1,089	2,296
Resurvey.....		68	71
Total for season.....	19,653	17,645	13,927
Number of parties.....	31	26	34
Average miles per party.....	634	679	410

NOTE:—Owing to the nature of their work the parties under Messrs. E. Bartlett, P. R. A. Belanger, G. B. Bemister, E. L. Burgess, J. H. Brownlee, A. J. Campbell, P. C. Coates, C. Engler, L. E. Fontaine, E. W. Hubbell, A. W. Johnson, H. P. Keith, J. A. Kirk, F. H. Kitto, G. J. Lonergan, C. F. Miles, R. D. McCaw, W. Ogilvie, H. G. Phillips, H. B. Proudfoot, W. R. Reilly, H. W. Selby, W. Thibaudeau and G. L. Williams are not included in the statement of mileage for the year ended March 31, 1911.

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COST OF SURVEYS.

The following statement shows the average cost per mile of surveys executed by surveyors under daily pay and by surveyors under contract:

	Surveyed under daily pay.	Surveyed under contract.
Total mileage surveyed	3,962	13,927
Total cost	\$388,600	\$376,477
Average cost per mile.	\$98.08	\$27.03

The high average cost per mile of \$27.03 for contract surveys as compared with \$17.97 for 1909 is due to the fact that all the townships subdivided during 1910 were wooded while of those subdivided in 1909, 169 were open prairie; the relative rates per mile for surveys in open prairie and in solid bush are as \$7.50 to \$31.

The average cost per mile for surveys performed under day pay increased from \$49.33 in 1909 to \$98.44 in 1910. The average per mile for block outline surveys was \$175 as compared with \$167 in 1909. When the party under Mr. B. J. Saunders, D.L.S., is omitted from the calculation the average cost per mile for block outline surveys is found to be about ten dollars per mile lower in 1910 than in 1909. Mr. Saunders was compelled to abandon the survey of the nineteenth base line west of the fourth meridian when only a few miles had been run, but after all the initial expenses of organization, travel, &c., had been incurred. Other factors to increase the average cost of the surveys in 1910 were the larger number of parties working in the foot-hills in Alberta and in the railway belt in British Columbia and the smaller number engaged upon miscellaneous surveys, resurveys and restoration surveys in other parts of Alberta and in Saskatchewan and Manitoba. Owing to the nature of the country surveys in the foot-hills and in British Columbia are much more difficult than in the level and settled districts, and consequently slower and much more expensive. The average cost per mile of surveys in the foot-hills in Alberta during 1910 was \$79, and in British Columbia \$85, while the cost in Saskatchewan and Manitoba and other parts of Alberta was \$33 per mile.

DESCRIPTIONS OF TOWNSHIPS.

Descriptions of the townships subdivided during the year have been compiled from the surveyors' reports and will be published in a separate volume.

The subdivision surveys performed prior to March 31, 1910, those made between that date and March 31, 1911, and the resurveys executed during the same period are shown in colours upon the map which accompanies this report.

MANUAL OF SURVEY.

The seventh edition of the Manual of Survey which at the time of the issue of last year's report was in the hands of the printers has since been published and distributed to Dominion Land Surveyors and to the members of the office staff.

CONFERENCE OF SURVEYORS GENERAL.

At the Colonial Conference held in 1907, the following resolution was adopted:—

“ That it is desirable that reciprocity should be established between the respective Governments and examining authorities throughout the Empire with regard to the examination and authorization of land surveyors, and that the memorandum of the Surveyors’ Institution on this subject be commended to the favourable consideration of the several Governments.

At the suggestion of the Surveyors’ Institution, of London, a conference of the Surveyors General of the Colonies was called by the Imperial Government to meet in London on the 24th of October, 1910, to discuss the question of reciprocity in the authorization and examination of surveyors throughout the Empire. By order in council of the 21st July, 1910, I was authorized to attend the Conference and proceeded to London for that purpose. At the last moment it was found that circumstances in connection with the establishment of the Union of South Africa prevented the representation of the Union at the Conference. Moreover, the New Zealand Ministers and the State Governments of Australia expressed the wish that the Conference should be postponed to the next year and it was postponed accordingly.

CORRESPONDENCE.

The correspondence of this Branch consisted of:

Letters received.. . . .	11,304
Letters sent.. . . .	13,580

ACCOUNTS.

The Accountant’s record shows:

Number of accounts dealt with.. . . .	876
Amount of accounts.. . . .	\$961,340
Number of cheques forwarded.. . . .	3,298

OFFICE STAFF.

The office staff of the Topographical Surveys Branch at Ottawa consists of one hundred and twenty-six employees, or an increase of thirteen over last year. A list of the staff is given as Appendix No. 9 of this report.

Eighteen appointments were made to the staff, three employees were transferred to other branches of the Department and two resigned.

The appointments were Messrs. M. T. O’Meara, A. C. Pick, R. C. McCully, J. N. H. Gagnon, E. E. La Beree, C. S. Jones, C. P. Dubuc, C. H. Cagnat, O. E. Fournier, C. M. Ross, A. H. Beaubien, C. Baril, Jas. Howie, W. A. Purdy, J. H. Brigley, B. J. Ree, J. A. Watson and H. E. Hare. Messrs. A. L. Cumming and G. C. Webb resigned while Mr. A. Paquette was transferred to the Registration Branch, and Messrs. F. H. H. Williamson and B. E. Norrish to the Railway Lands Branch.

CHIEF DRAUGHTSMAN’S OFFICE.

(P. B. Symes, Chief Draughtsman.)

The six sections into which the draughtsmen are divided have continued during the past year on the same lines as before with very little change in the nature of the work or the methods of handling it.

The sketch maps now furnished by surveyors of base lines give valuable information and together with the sketches accompanying progress reports from other surveyors in the field, now made to supply more information than formerly, provide better

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material for mapping the country and arranging for subsequent surveys than was previously available.

The number of township plans compiled and drawn for printing is considerably in excess of the number issued in previous years. This is due chiefly to the greater proficiency attained by the draughtsmen employed, as the number of men available has been about the same as last year ; there are still, however, large arrears to be made up before this part of the work can be brought down to date. We have been unable to continue the issue of topographical plans of the townships owing to the pressure of other work, although a considerable amount of compiling has been done ; one plan covering four townships was printed as an experiment. It is hoped that this very desirable series of plans can be proceeded with before long.

The miscellaneous business, inquiries as to surveys made or proposed, areas, corner monuments, actual or supposed errors in lines, petitions for resurveys, etc., continues to steadily increase.

Details of work in the different sections are given in the reports below by the several heads of sections, and the usual schedule of work executed during the twelve months is added in Appendix No. 5.

CHIEF DRAUGHTSMAN'S OFFICE.

FIRST SECTION.

SURVEY INSTRUCTIONS AND GENERAL INFORMATION.

(T. E. Brown, Chief of Section.)

Twenty-one men are employed in this section, the work in general being the preparation of instructions for the surveyors who are engaged in field operations, the care of the office registers, the issuing of preliminary plans, the answering of enquiries from settlers and others and the preparation of the annual report of the Branch.

During the winter months sketches showing previous surveys are compiled for those districts where it is probable that subdivision surveys will be extended during the following season. In addition information is collected as to the nature of the country, Hudson's Bay company's posts, Indian reserves, trails, etc. In March and April as a rule we are notified of the surveyors selected to take charge of parties under daily pay and of those to whom contracts are awarded. Notifications are at once sent out informing each surveyor of the nature and location of his surveys ; detailed instructions are furnished later. During the year one hundred and eighty-two drafts of instructions were prepared involving the compiling of 1,115 sketches, and 35 maps and tracings.

While in the field surveyors are required to furnish to the office sketches showing the progress of their work. Entries in the office registers show that 1,206 progress sketches were received and that surveyors furnished also 466 books of field notes for township surveys, 294 books and 509 plans, sketches, etc., for miscellaneous surveys, 278 timber reports, 123 statutory declarations of settlers and returns for 987 magnetic observations and for 48 timber berths. General reports on their survey operations were received from forty-three surveyors.

Their examination having been completed 772 books of field notes were placed on record together with 273 plans of miscellaneous surveys and 123 statutory declarations.

Plans of 740 townships and of 13 settlements or townsites were received from the lithographic office, entered in the registers and distributed, as well as 84 sectional maps and 184 miscellaneous plans.

Preliminary plans were issued for 347 townships.

Eighteen hundred and twenty-seven communications from settlers and others and inquiries from other branches were received and dealt with ; to do this required the preparation of 2,606 sketches, 99 maps and tracings and the copying of 627 pages of field notes. Thirteen descriptions of parcels of land were drafted.

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The compilation of a set of maps to illustrate discrepancies in the surveys and to show closings of township surveys was continued throughout the year ; six new sheets were made and twenty-one revised and brought up to date.

Two thousand four hundred and twenty-five files were received from the Correspondence Branch for use in the work of this Branch. Four thousand eight hundred and thirty-one draft letters and memoranda were written.

Eight hundred copies of the seventh edition of the Manual of Instructions were distributed.

CHIEF DRAUGHTSMAN'S OFFICE.

SECOND SECTION

SURVEYS IN MANITOBA, SASKATCHEWAN AND ALBERTA.

(T. S. Nash, Chief of Section.)

The examination of surveys in the Yukon Territory has been added to the work of this section so that now the section has charge of the examination of the survey returns of all Dominion lands except those in the railway belt of British Columbia. The average strength of the staff for the year was twenty-four men.

In connection with subdivision surveys, sketches sent in by surveyors showing the progress of the work in the field are examined to see that the surveys are being made correctly and in accordance with the instructions. These sketches form the basis for the advances made to contractors. During the year, 978 progress sketches were received and examined, 411 having been sent in by surveyors employed by the day, 403 by contractors and 164 by inspectors.

When a surveyors's final returns are received, a cursory examination is made of them to detect any serious discrepancies or omissions, and, if necessary, they are returned to the surveyor for correction. Compiled plans are then made from these returns. Plans of 805 townships were compiled and sent to the draughtsmen to be drawn for reproduction, which number includes the first edition plans of 234 townships. An examination was made of 314 subdivision surveys, 260 township outline surveys and 142 miscellaneous surveys. Compiled plans of 13 miscellaneous surveys were also sent to the draughtsmen, including a plan of McMurray settlement in northern Alberta and a plan of resurvey of St. Albert settlement.

When compiling, a very careful examination of the returns of the new survey is made, and a memorandum of any discrepancies or omissions is sent to the surveyor; 408 such memoranda were sent and 374 replies were received, and the necessary corrections made in the final returns.

Twelve hundred and seventy letters in connection with the year's work were drafted.

On May 25 the work of examining Yukon Territory surveys was transferred from the fifth section, as the staff there was not large enough to attend to this work. The examination of these returns is up to date though the plotting is not, owing to a lack of proper connections and base line surveys. Throughout the year 118 group lot surveys were examined including 47 received the previous year; 21 base line surveys were also examined 8 of which were previously received. Of these, 45 group lots and four base lines were plotted on the Yukon Territory plans.

The question of issuing plans of the Yukon survey for the convenience of the public has been under consideration and it is proposed to undertake this work during the coming year.

The reports of the inspectors of contract surveys are examined and dealt with in this section; a detailed description of the method of inspection was published in the report of last year. Reports on the inspection of 29 contracts were received during the year and 30 contract accounts were prepared and closed.

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The number of odd jobs dealt with by this section is steadily increasing. One hundred and ninety-five requests for information concerning surveys were received from other branches of the Department involving the calculation of 990 areas. Two hundred and twenty-nine plans of road diversions submitted by the provincial governments of Saskatchewan and Alberta were examined.

The plans and notes of 33 timber berths were examined comprising 152 blocks whose boundaries totalled 1,202 miles of survey and whose area is approximately 770 square miles.

Fifty-five plans of right of way of railways were examined, the mileage of which amounted to 1,268 miles. As several of these plans were in duplicate or triplicate the gross mileage of plans examined was 3,016.

CHIEF DRAUGHTSMAN'S OFFICE.

THIRD SECTION—DRAWING FOR REPRODUCTION.

(C. Engler, Chief of Section.)

The staff of this section, during the past year, has been steadily engaged in the preparation of plans for printing and nothing has interrupted the work. The personnel of the staff is fourteen, one more than last year, as two new appointments were made and one clerk was transferred to the second section.

The work is steadily increasing as may be seen from a comparison of the number of township plans issued during the last four years.

1907-08 plans issued..	568
1908-09 " "	612
1909-10 " "	713
1910-11 " "	808

Besides township plans many plans of townsites, settlements and other surveys were made as well as work done of a miscellaneous character. The total number of such plans and odd jobs was 231; this includes maps to accompany the report of the Branch, the Astronomical field tables, diagrams showing altitude of Polaris, and plans to accompany orders in council.

The small printing-press is constantly in use printing foot-notes and titles for plans, labels and forms for office use, and many kinds of lettering formerly done by hand.

The method of preparing plans for printing has been fully described in former reports, and no important changes have been introduced during the year. The copying of the plan by means of the tracing frame, the addition of all letters and figures by means of type held in a small tripod, and the addition of all foot-notes, titles, etc., by means of the small printing-press are still followed. An effort is now being made to print such foot-notes and titles directly on the plans instead of printing them on slips of paper which are then pasted to the plans. This, of course, is possible only with the smaller plans as the larger plans cannot be put into the press.

Among the members of the staff of this section are an engraver, a lithographic artist and a mechanical draughtsman. Though not employed by the Department in these capacities their services are made use of when the occasion arises. During the past year the engraver numbered all the technical instruments such as transits, watches, cameras, etc., in the possession of the Branch, the artist has been called upon frequently to design coloured covers for pamphlets issued by the Department, and the mechanical draughtsman makes the drawings of alterations in instruments, etc. Another clerk is an engrosser, and although there is not much necessity for such work, it has occasionally been found useful in adding titles to photographic albums.

CHIEF DRAUGHTSMAN'S OFFICE

FOURTH SECTION—BRITISH COLUMBIA SURVEYS.

(*E. L. Rowan-Legg, Chief of Section.*)

The work of this section has been the examination of surveyors' field notes, subdivision surveys, timber berths, mineral claims and miscellaneous surveys. Township and quarter township plans have been compiled, the latter supplanting the former in greater number each year as the information required to be shown increases. The work of compiling some of these plans is difficult and tedious on account of the number of field notes of both Dominion and Provincial surveys which have to be consulted.

Much time is often taken up replying to requests for information; in many cases a simple question requires a long search through field notes and correspondence on files.

As the number of surveyors engaged on subdivision was double that of the previous year, the work of preparing instructions and making sketches to accompany the same was greatly increased.

In 1909 Mr. A. W. Johnson made a survey of villa lots at Woodhaven in sections 23, 24 and 25, fractional township west of township 39, west of the coast meridian, and a plan of the survey was compiled in this office. Considerable trouble and delay arose in compiling this plan; the returns were only pencil field notes as the surveyor had to undertake other important work before completing his returns of the survey, and a large number of calculations had to be made by the compiler. A plan to accompany a pamphlet on Woodhaven was also made.

Plans of the towns of Yale and Golden were issued during the year.

The staff of this section consists of nine men, which is the same as last year.

The work of this section consisted of:—

Preliminary plans issued..	56
Township plans compiled..	113
Townsite plans compiled..	2
Plans and sketches made..	312
Returns of township subdivision examined,—	
Books..	27
Plans..	31
Returns of miscellaneous surveys examined,—	
Books..	8
Plans..	15
Returns of timber berths examined..	31
Returns of mineral claims examined..	16
Letters and memoranda written..	1,064
Return of timber berths made..	1
Requests for various information dealt with	841
Letters of instructions drafted..	109

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CHIEF DRAUGHTSMAN'S OFFICE

FIFTH SECTION—MAPPING.

(J. Smith—Chief of Section.)

The staff of this section has been increased from ten to thirteen; but the amount of absence, due to sickness, has been equivalent to the absence of one man the whole year.

The only Yukon work done by this section was the registering of returns of surveys received and the examination and correction of about four hundred photocopies of plans that are filed in the Dawson office. On May 25, 1910, all the Yukon work was transferred to the second section.

The sectional map work is as follows:—

Sectional maps, 3 miles to an inch, reprinted.. . . .	38
Sectional maps, 3 miles to an inch, revised.	56
Sectional maps, 6 miles to an inch, reprinted.. . . .	46
New tracings, 2 miles to an inch.. . . .	16
Proofs examined.. . . .	45
Letters and memoranda written.. . . .	366
Letters and memoranda received.. . . .	163
Returns of timber berth surveys used in compiling.. . . .	248
Township plans used in compiling.. . . .	568
Plans of railways used in compiling.. . . .	51
Field books of surveys used in compiling.. . . .	215
Plans of surveyed roads used in compiling.. . . .	377
Plans of Indian Reserves used in compiling.. . . .	46
Post-office names and positions checked and compiled.. . . .	758

The following miscellaneous work was also done by this section:

A plan of the subdivision of Woodhaven was plotted and two tracings made, together with a small key-map showing the position of Woodhaven.

A revised and enlarged index map was made as copy for the engraving of a new map which includes the "Peace River Block" and as far north as lake Athabaska.

The work of reproducing A. O. Wheeler's map of part of the Rocky mountains was prepared for the photographer, and a portion of the map of the Selkirk range was traced for the same purpose.

CHIEF DRAUGHTSMAN'S OFFICE

SIXTH SECTION—SCIENTIFIC AND TOPOGRAPHICAL WORK.

(G. B. Dodge, Chief of Section.)

CORRESPONDENCE.

Letters received and referred to this section.. . . .	435
Letters of instructions prepared.. . . .	44
Draft letters prepared.. . . .	546
Office memoranda sent.. . . .	278

LEVELS.

All the surveyors on base lines are required to run levels. Bench-marks are established at intervals not greater than one mile apart. Whenever it is at all possible these bench-marks are cut in the rock, a mark being cut with the cold-chisel. Where rock is not available trees may be used, the trees being blazed and the letters B.M.

with the number of the bench-mark being cut on the tree. The descriptions of the bench-marks are given and they are referenced by the chainage on the line and the approximate distance north or south. The difference of elevation between successive bench-marks is checked either by a second independent line or by a system of double turning points, these differences of elevation being required to check within 0.2 feet per mile, not a very high grade of accuracy, but probably sufficient for most practical purposes, and it was not considered advisable to ask for too high a standard at the initial stages of the work. Surveyors this past year have been requested to take aneroid readings conjointly with the levels to enable us to obtain approximate data until ties can be made with railway levels. These aneroid readings have not yet been reduced so that no statement can be made of their probable accuracy.

Level returns for 1910 received to date.. . . .	648 miles
Previous levels.. . . .	854 miles
Total levels to date.. . . .	1,502 miles
Total level returns examined and profiles plotted.. . . .	1,304 miles

MAGNETIC OBSERVATIONS.

The subject of Terrestrial Magnetism has received a great deal of attention within recent years among the civilized countries of the world. Magnetic surveys are being conducted in several countries. The United States have now very complete information over their whole country and are able to publish a fine isogonic map. For some time past we have felt the need of such a map for the district covered by our own work and have received numerous enquiries from others for the same. This office is most advantageously situated to gather this information. Having a large staff of surveyors in the field every year, scattered over a large area, we are able to collect in a short time and at no additional expense a large amount of magnetic information. All surveyors employed by the day are required to take these observations. The magnetic needles now supplied are especially designed for this work and with few exceptions are very sensitive. Through the courtesy of Mr. R. F. Stupart, the Director of the Meteorological Service, the compasses are all tested by the officer in charge of the Magnetic Observatory at Agincourt and the index correction determined. Where the needles are found to be anything but first class, a new compass is furnished the surveyor.

In the reduction of the observations to a common epoch we are very much handicapped by the absence of a magnetic observatory in the territory covered by the observations. Two of the staff of this division were placed at widely separated points in the Northwest this past season taking hourly declination readings for a whole month. These observations were afterwards plotted and compared with the daily photographic trace of the declinometer at Agincourt. Investigation of the results appear to show that the reduction of our declination observations by means of the Agincourt records is well worth the trouble, the precision of the resulting declination being apparently increased about two and one-half times. It is realized, however, that this is really not much more than a makeshift, and that what we require for proper reductions are the records of an observatory in the Northwest. This matter is now under consideration by the Director of the Meteorological Service who states that he may possibly be able to establish one there this coming season.

Declination returns for 1910, received to date.. . . .	987
Previous returns.. . . .	1,104
Total returns to date.. . . .	2,091
Declination observations, 1910, for comparison with Agincourt	908
Dip observations, 1910.. . . .	94
Total force observations, 1910.. . . .	72

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TRIANGULATION

Owing to an insufficient staff and press of other work, the office computations of the triangulation in the railway belt in British Columbia is entirely in arrears, nothing whatever having been done with it. The office needs the information which the triangulation will give and we are also receiving outside requests for information. A special effort will be made this coming year to get the work up, and we hope to be able to state in our next report that the computations are up to date.

ASTRONOMICAL WORK.

All the returns of azimuth observations from block surveyors for the year 1909 have been examined and checked.

The latitude observations of Mr. C. Engler, D.L.S., taken at Fort Smith in 1910 have been examined and checked.

The astronomical field tables for twelve months have been computed.

STAR DIAGRAMS FOR LATITUDE OBSERVATIONS.

Rapid settlement of the country has compelled the abandonment for some years past of the old ideal system of running base lines in blocks across four ranges. In order to keep sufficiently in advance not to retard the subdivision, block surveyors have been required to run the base lines right across between adjacent meridians. There is thus no closing on their work for a distance of perhaps 150 miles or more. The positions of the base lines again are dependent on the meridians. For this reason the new model base line transit has been designed and fitted with accessories for the purpose of taking latitude observations by Talcott's method. Surveyors on meridians will in future be expected to take frequent latitude observations to provide an efficient independent check against any considerable error in chainage. Perhaps the most tedious part of a latitude observation by Talcott's method is the preparation of the observing list, especially when several star catalogues have to be consulted. To facilitate the preparation of these observing lists and save the surveyor's time, star charts were compiled in 1908 and were described in the report for that year. These charts contain stars to the fifth magnitude only. It was found last year that the telescopes on the latest base line transits were sufficiently powerful to observe most stars marked up to the seventh magnitude without difficulty. Our observing lists were, therefore, very much restricted when made from the star charts. The stars had been plotted directly from the different catalogues, that is to say, the positions had not been referred to a common epoch but to the epoch of the catalogue from which they had been taken, so that some stars were plotted for epoch 1890, some for 1900 and some for 1908. It was therefore, decided to entirely replot the charts, reducing all star places to epoch 1910, and embracing all stars up to the seventh magnitude. This has now been completed and the charts have been printed. The charts contain all stars within the desired limits of declination given in the Nautical Almanac, Berliner Jahrbuch, Connaissance des Temps, Star List of American Ephemeris, Greenwich Second Nine-Year Catalogue for 1900, Greenwich second Ten-Year Catalogue for 1890, Ambronn Sternverzeichnis, 1900. There are 6,740 stars in all. We have now in hand the preparation of a star list to be used in conjunction with the star charts. This list will give the mean places for 1910 of all the stars plotted and is intended to take the place of different catalogues.

TOPOGRAPHICAL WORK.

Topographical plans of 156 townships were compiled.

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TESTING LABORATORY.

The testing laboratory, the absence of which has prevented the proper testing of surveyors' instruments, is at last under construction and will be finished shortly.

PHOTOGRAPHIC OFFICE.

(J. Woodruff, Chief Photographer.)

The work of the chief photographer has greatly increased. Especially is this noticeable in velox printing in which department 4,770 prints were made. Last year the velox were included in the bromide work, but are now classed separately.

The purchase of a new velox printing machine fitted with a mercury vapour lamp enables one to turn out velox and artura prints expeditiously.

Increases are shown in dry plate developing and in solio printing. Blue prints also show a marked increase. The process of bromide enlarging has been greatly expedited by the installation of a five-tube mercury vapour lamp, by means of which enlargements or lantern transparencies can be made at any time, and not be dependent on the sunlight as hitherto.

Last summer the chief photographer visited Quebec, Father Point and Rimouski, where he obtained negatives of shipping, incoming immigrants, landing of the mails, etc. He also visited many places in the Eastern Townships and took photographs of cattle, farms and farming operations, for the use of the Immigration Branch.

The total of work executed during the year shows an increase of 50 per cent over that of the year previous. The staff is the same as that of last year.

PHOTOGRAPHIC OFFICE—PROCESS WORK.

(H. K. Carruthers, Process Photographer.)

The new frame for hanging copying camera and copying board mentioned in last year's report has given excellent satisfaction and during the past year representatives of outside firms visited the office to inspect this most up-to-date apparatus. Two firms outside the city are copying this camera to use in their photographic studios.

With the removal of the printing department from this office to the Imperial building we will have more room at our disposal and hope in the course of the next two or three months to be able to make our large size negatives of 24" x 32".

We are installing in the basement of the Imperial building the machinery for a photo-engraving plant transferred to us by the Public Works Department and when this is installed, any half-tone and line cuts required for our Branch can be made in this office.

An interesting piece of photo-lithography was started this year, the reproduction in colours of Mr. A. O. Wheeler's map of the main range of the Rocky Mountains with parts of the Dogtooth and Selkirk Mts. This will require the making of about fifty negatives 16" x 18" and a considerably larger number of photo-lithographs. The expense of reproducing this will be less than one-quarter the cost of engraving it on stone.

BOARD OF EXAMINERS FOR DOMINION LAND SURVEYORS.

(F. D. Henderson, Secretary.)

The Board of Examiners for Dominion Land Surveyors held two meetings during the year. The first was a special meeting lasting from April 30 to June 6 (inclusive), 1910, during which examinations were held at Ottawa, Montreal, Toronto, Winnipeg and Vancouver. The second was the regular annual meeting called for by section 9 of the Dominion Lands Surveys Act. It began on Monday, February 13, 1911, and

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lasted until March 30, 1911. During this meeting examinations were held at Ottawa, Halifax, Montreal, Kingston, Toronto, Winnipeg, Calgary, Edmonton and Vancouver. The total number of candidates for examination was 257. Of these 186 tried the preliminary examination as against 362 in 1909-10. Sixty-nine tried the final, and two tried the examination for Dominion Topographical Surveyor. Sixty-four candidates were successful at the preliminary examination as follows :

PRELIMINARY EXAMINATION.

Alexander, Walter C., Ottawa, Ont.	Macdonald, Alexander Gilmour, Toronto, Ont.
Aslat, Edward K. S., Northminster, Sask.	Macpherson, Harold Nolan, Kemptville, Ont.
Bolton, Lambert E. B., Wiarton, Ont.	Marshall, Joseph A. P., London, Ont.
Bowman, James Thornley, London, Ont.	Meikle, Angus Urquhart, Kingston, Ont.
Bradley, James Dennis, Ottawa, Ont.	Moulton, Hazen Parker, Ottawa, Ont.
Brown, Lindsay, O., Ottawa, Ont.	MacLaurin, James Gladstone, Vankleek Hill, Ont.
Cameron, Max, G., Peterborough, Ont.	MacLeod, David Douglas, Parkhill, Ont.
Chisholm, Kenneth, Gordon, Halifax, N.S.	McCloskey, Michael D'Arcy, Chelsea, P.Q.
Clark, H. Jackson, Wellington, Ont.	McCully, Robert Chesley, Ottawa, Ont.
Coltham, George, William, Aurora, Ont.	McKay, Robert B., Vancouver, B.C.
Cordukes, John Patrick, Ottawa, Ont.	Norrish, Wilbert Henry, Guelph, Ont.
Coté, J. Aurèle, Ottawa, Ont.	Perron, Hermel Marie, Edmonton, Alta.
Cousineau, Aimé, Ottawa, Ont.	Prevost, Raoul de M., St. Jerome, P.Q.
Dawson, Irvin Harrison, St. Catharines, Ont.	Ratz, John Earl, Elmira, Ont.
Dennis, Thomas Clinton, Ottawa, Ont.	Richardson, Colin Esdaile, Toronto, Ont.
Dimock, Clarence Lewis, Upper Newport, N.S.	Roberts, Otto B., Kingston, Ont.
Earle, Henry Arthur, Toronto, Ont.	Roberts, George Rowland, Winnipeg, Man.
Edgecombe, G. Harold, Ottawa, Ont.	Ross, Charles Cathmer, Ottawa, Ont.
Elliott, George Reginald, Goderich, Ont.	Sibbett, William Algernon, Bracebridge, Ont.
Ford, John W. H. London, Ont.	Smith, K. Harold, Harrow, Ont.
Fredette, Joseph Frédelin, Ottawa, Ont.	Smith, Neville Herbert, Ottawa, Ont.
Gibson, Colin W. G., Toronto, Ont.	Surette, Germain Augustin, West Pubnico, N.S.
Goodman, Hyman Meyer, Toronto, Ont.	Vickers, Newell, Renwick, Ont.
Gordon, Heber, Leduc, Alta.	Von Edeskuty, Joseph Otto, Calgary, Alta.
Gorman, Edwin, Buckingham, P.Q.	Wadlin, Lorenzo Norette, Ottawa, Ont.
Haggen, Geoffrey Loosmore, Revelstoke, B.C.	Warrington, George Albert, Cornwall, Ont.
Hotchkiss, Cyrus Percival, Edmonton, Alta.	White, Donald Alexander, Ottawa, Ont.
Huether, Alvin, D., Wiarton, Ont.	Wight, Edmund James, Ottawa, Ont.
Jarvis, Ralph Hemsworth, Toronto, Ont.	Workman, Thomas Oswald, Ottawa, Ont.
Johnson, Hubert Colpoys, Ottawa, Ont.	Wright, James Goldwin, Valleyfield, P.Q.
King, Arthur Harry, Edmonton, Alta.	Zinkan, William Edward, Southampton, Ont.
Kingston, Kenneth J., Ottawa, Ont.	
LaBeree, Edwin E., Ottawa, Ont.	

Thirty-eight candidates were successful at the final examination as follows :

FINAL EXAMINATION.

Bartlett, Ernest, Smithville, Ont.	Lee, Roger Melville, Galt, Ont.
Bennett, George Arthur Eden, Ont.	Martindale, Ernest Smith, Kingsmill, Ont.
Bush, Clayton E., Toronto, Ont.	Martyn, Oscar William, Mitchell, Ont.
Chartrand Donat Emile, Ottawa, Ont.	Menzies, James Mellon, Ottawa, Ont.
Chase, Albert Victor, Orillia, Ont.	Miller, Henry Belfrage, Montreal, P.Q.
Cowper, George Constable, Welland, Ont.	Murray, Ernest William, Seaforth, Ont.
Dawson, Frederick, James, Ashcroft, B.C.	McElhanney, William George, Vancouver, B.C.
Day, Harry Samuel, St. John, N.B.	McMaster, William A. A., Palmerston, Ont.
Dennis, William Melbern, Ottawa, Ont.	Pearce, Seabury Kains, Calgary, Alta.
Dillabough, James Vidal, St. Boniface, Man.	Pequegnat, Marcel, Berlin, Ont.
Eagleson, Francis Merwin, Gorrie, Ont.	Powell, William Hall, Little Harbor, N.S.
Evans, Stanley Livingstone, Athens, Ont.	Rainboth, George Louis, Ottawa, Ont.
Glover, Arthur Edward, Beaverton, Ont.	Ransom, John Thomas, Toronto, Ont.
Grassie, Charles Andrew, Welland Ont.	Roy, Joseph Emile, Quebec, P.Q.
Gray, James Edward, Uxbridge, Ont.	Seibert, Frederick V., Southampton, Ont.
Heuperman, Frederick Justinus, Calgary, Alta.	Taylor, William Emerson, Owen Sound, Ont.
Hoar, Charles Millard, Ottawa, Ont.	Walker, Claude Melville, Guelph, Ont.
Johnston, William James, St. Catharines, Ont.	White, Walter Russel, Ottawa, Ont.
Keith, Homer Pasha, Edmonton, Alta.	Wilson, Reginald Palisser, Winnipeg, Man.

One candidate, Wilmot Maxwell Tobey, Ottawa, passed the examination for Dominion Topographical Surveyor.

As in former years, the time of the Board at both meetings was largely taken up with the reading and valuation of the candidates' answers, and in the preparation of sets of question papers for the next examination.

In addition to this the evidence submitted by candidates at the final examination, in proof of their eligibility therefor, had to be examined. This evidence consisted of certificates of Provincial Land Surveyors, and of affidavits of service under articles of apprenticeship.

Section 22 of the Dominion Lands Surveys Act provides for a shortening of the term of service from three years to one year for men holding diplomas or certificates from technical colleges; and it is provided that "it shall rest with the Board to decide whether the course of instruction in such college or university meets the requirements of this section."

Applications for admission to the privileges of section 22 are being constantly received. Several such from graduates of Canadian, British, and foreign universities and colleges were considered by the Board, and decisions reached in regard to graduates of these institutions which will guide the Board in dealing with similar applications in future.

Oaths of office and allegiance, and bonds for the sum of one thousand dollars each, as required by section 25 of the Act, were received from, and commissions as Dominion Land Surveyors issued to, thirty-six surveyors.

Every Dominion Land Surveyor is required to be in possession of a subsidiary standard of length (D. L. S. Act Sec. 35). Thirty-eight new standards were issued to surveyors, two, which had changed hands, were re-tested, and fifty-four were sent to the Surveyor General of British Columbia for the use of British Columbia surveyors. A list of surveyors who have been furnished with standard measures up to March 31, 1911, will be found in Appendix No. 10.

The correspondence of the Board was as follows :

Letters received	1,705
Letters sent	950
Circular letters, pamphlets and parcels sent	1,512

APPENDICES.

The following schedules and statements are appended :

- No. 1. Schedule of surveyors employed and work executed by them from April 1, 1910, to March 31, 1911.
- No. 2. Schedule showing for each surveyor employed from April 1, 1910, to March 31, 1911, the number of miles surveyed of township section lines, township outlines, traverses of lakes and rivers and resurvey ; also the cost of the same.
- No. 3. List of lots in the Yukon Territory surveys of which have been received from April 1, 1910, to March 31, 1911.
- No. 4. List of miscellaneous surveys in the Yukon Territory returns of which have been received from April 1, 1910, to March 31, 1911.
- No. 5. Statement of work executed in the office of the chief draughtsman.
- No. 6. List of new editions of sectional maps issued from April 1, 1910, to March 31, 1911.
- No. 7. Statement of work executed in the photographic office from April 1, 1910, to March 31, 1911.
- No. 8. Statement of work executed in the lithographic office from April 1, 1910, to March 31, 1911.
- No. 9. List of employees of the Topographical Surveys Branch at Ottawa giving the name, classification, duties of office and salary of each.
- No. 10. List of Dominion Land Surveyors who have been supplied with standard measures.
- Nos. 11 to 51. Reports of surveyors employed.

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MAPS AND PROFILES.

The following maps and profiles accompany this report:

Map showing subdivision surveys and resurveys made from April 1, 1910, to March 31, 1911.

Maps to accompany reports of surveyors.

Profiles of certain base lines.

I have the honour to be, Sir,

Your obedient servant,

E. DEVILLE,

Surveyor General.

TOPOGRAPHICAL SURVEYS BRANCH
SCHEDULES AND STATEMENTS

APPENDIX No. 1.

SCHEDULE of Surveyors employed and work executed by them, from April 1, 1910, to March 31, 1911.

Surveyor.	Adauress.	Description of Work.
Akins, J. R...	Ottawa, Ont...	Production of the sixth base line across ranges 7, 8 and part of 9; part subdivision of township 24, range 6 and townships 21 and 22, range 9; part resurvey of township 23, range 9 and township 24, range 6, west of the fifth meridian.
Aylsworth, C. F., ...	Madoc, Ont...	Retracement survey in township 13, range 6, townships 13 and 14, range 7 and township 13, range 8, east of the principal meridian; township 20, range 21 and township 29 range 32 west of the principal meridian; townships 30, ranges 1 and 2, townships 27 and 28, range 5 and township 2, range 12 west of the second meridian. Traverse in township 30, range 1, west of the second meridian, and subdivision survey and resurvey in townships 30 and 31, range 31, west of the principal meridian.
Baker, J. C...	Kingston, Ont...	Contract No. 13 of 1910. Subdivision of townships 57, 58, 59 and 60 ranges 26 and 27, west of the third meridian.
Bartlett, E...	Smithville, Ont...	Investigation of squatters' claims in the railway belt of British Columbia in the upper Columbia Valley in the vicinity of Golden.
Belanger, P. R. A...	Ottawa, Ont...	Inspection of part of contract No. 19 of 1909; reinspection of contract No. 33 of 1907, and inspection of mounding in contract No. 6 of 1909. Miscellaneous surveys in townships 22, 23 and 24, range 3, townships 22 and 23, range 4, townships 16, ranges 7 and 12 township 1, range 13, east of the principal meridian; townships 15 and 19, range 1, townships 15 and 24, range 2, townships 18 and 19, range 3, township 21, range 4, townships 14 and 22, range 6, township 21, range 7, township 22, range 8, township 30, range 9, townships 15 and 18, range 10, townships 9 and 18, range 11, township 30, range 15, township 32, range 18 and township 34, range 20, west of the principal meridian; townships 31 and 32, range 15, townships 44, 45 and 46, range 16, townships 45 and 46, range 17, township 37, range 19, township 38, range 21 and township 36, range 23 west of the fourth meridian; township 60, range 4, townships 58 and 60, range 5 and township 58, range 6 west of the fifth meridian. Survey of Bender settlement in township 19, range 1, west of the principal meridian.

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APPENDIX No. 1—*Continued.*

SCHEDULE of Surveyors employed and work executed by them, from April 1, 1910,
to March 31, 1911—*Continued.*

Surveyor.	Address.	Description of Work.
Bemister, G. B...	Winnipeg, Man...	Survey of blocks 1, 2 and 3 of timber berth No. 1713 in township 50, range 32, west of the principal meridian, and townships 48, 49 and 50, range 1 and townships 48 and 49, range 2, west of the second meridian.
Blanchet, G. H...	Ottawa, Ont...	Survey in townships 20 and 21, range 29, west of the fifth meridian; townships 21 and 23 range 1, township 23, range 2, township 21, range 6, townships 20, 22 and 23, range 8, township 23, range 9, and townships 21 and 22, range 11, west of the sixth meridian. Traverse in townships 20 and 21, range 29, west of the fifth meridian; township 21, range 1, township 23, range 2, township 21, range 6, and township 23, range 8, west of the sixth meridian. Resurvey in townships 20 and 21, range 29, west of the fifth meridian; township 21, range 1, township 23, range 2, township 21, range 6, township 23, range 8 and township 22, range 11, west of the sixth meridian.
Bridgland, M. P.	Calgary, Alta...	Subdivision of part of the northeast quarter of section 18, township 24, range 1 west of the fifth meridian. Miscellaneous surveys in townships 7 and 8, range 31 and township 13, range 32, west of the principal meridian; townships 5 and 7, range 19, township 5, range 20, township 9, range 23 and township 15, range 26, west of the second meridian; township 12, range 12 and township 18, range 14, west of the third meridian; township 10, range 14, townships 10 and 11, range 19, township 10, range 20, townships 9, ranges 22 and 23 and township 21, range 27 west of the fourth meridian; townships 24 and 31, range 1 and township 24, range 2, west of the fifth meridian. Survey of burial plot for R.N.W.M. Police in township 7, range 29, west of the third meridian. Triangulation surveys in the railway belt of B.C.
Brownlee, J. H...	Vancouver, B.C...	Survey of timber berth No. 529 in township 4, range 28, west of the sixth meridian, and block A in the south half of section 2, township 5, range 5, west of the seventh meridian.
Burgess, E. L...	Ottawa, Ont...	Resurvey and levelling in township 55, range 22, west of the fourth meridian.
Campbell, A. J.	Calgary, Alta...	Examination of land in the New Westminster district for the purpose of classification into fruit land, farming land, grazing land, timber land and worthless land.
Carson, P. A...	Ottawa, Ont...	Miscellaneous resurveys in townships 21 ranges 3 and 4, township 22, range 6, townships 23, ranges 7 and 11, township 27, range 14, township 31, range 16, township 34, range 18, township 45, range 22 and township 46,

APPENDIX No. 1—Continued.

SCHEDULE of Surveyors employed and work executed by them, from April 1, 1910, to March 31, 1911—Continued.

Surveyor.	Address.	Description of Work.
		range 23 west of the second meridian; townships 43 and 43A, range 2, townships 34 and 43, range 3, township 39, range 4, townships 33 and 49, range 5, township 47, range 16, townships 39 and 40, range 22, townships 37, ranges 23 and 24, townships 37 and 47, range 25, and township 48, range 27, west of the third meridian. Investigation in township 43, range 2, township 33, range 3, township 38, range 4, townships 33 and 50, range 5, and townships 37, ranges 25 and 26, west of the third meridian. Traverse in township 21, range 4, township 34, range 18, townships 37, 38 and 42, range 21, townships 38 and 39, range 22, and township 38, range 23, west of the second meridian; townships 34 and 36, range 2, township 34, range 3, township 33, range 6, township 39, range 14, township 43, range 16 and township 40, range 26, west of the third meridian. Resurvey of "lot 1, group 267" in Red Pheasant Indian reserve in township 41, range 15, west of the third meridian.
Cautley, R. H. . . .	Edmonton, Alta. . . .	Contract No. 30 of 1910. Subdivision of townships 55 and 56, range 17, townships 55, ranges 18, 19 and 20, and the north third of townships 54, ranges 17, 18, 19 and 20, west of the fifth meridian.
Chilver, C. A. . . .	Walkerville, Ont. . . .	Contract No. 17 of 1910. Subdivision of township 69 range 15, townships 68 and 69, ranges 16 and 17, and township 67, range 18, west of the fourth meridian.
Christie, W.	Prince Albert, Sask. . .	Survey of the eighteenth base line across ranges 1 to 12 and the twentieth base line across ranges 1 to 9 west of the fourth meridian.
Coates, P. C.	Whaletown, B. C. . . .	Survey of timber berth No. 356 in townships 23 and 24, range 1, west of the sixth meridian.
Coté, J. L.	Edmonton, Alta.	Contract No. 19 of 1910. Subdivision of townships 68 and 69, ranges 21, 22 and 23, west of the fourth meridian.
Cumming, A. L. . . .	Cornwall, Ont.	Survey of township 52, range 26, and part survey of townships 49, 50 and 51, range 25 and township 51, range 26, west of the fifth meridian. Traverse in township 50, range 26, townships 49 and 50, range 27, townships 47, 48 and 49 range 28, west of the fifth meridian, and township 47, range 1, west of the sixth meridian.
Davies, T. A.	Edmonton, Alta.	Contract No. 24 of 1910. Subdivision of townships 61, 62 and 63, ranges 21 and 22, west of the fourth meridian.

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APPENDIX No. 1—*Continued.*

SCHEDULE of Surveyors employed and work executed by them, from April 1, 1910,
to March 31, 1911—*Continued.*

Surveyor.	Address.	Description of Work.
Deans, W. J...	Brandon, Man..	<p>Sudivision in townships 25 and 26, ranges 20 and 21, west of the fifth meridian; townships 23 and 24, ranges 7 and 8, and township 22, range 10, west of the sixth meridian.</p> <p>Traverse in townships 25 and 26, range 21, west of the fifth meridian; township 24, range 7, townships 23 and 24, range 8 and township 22, range 10, west of the sixth meridian.</p> <p>Resurvey in townships 25 and 26, range 21, west of the fifth meridian; townships 21 and 22, range 10, west of the sixth meridian.</p>
Dumais, P. T. C...	Hull, Que..	Contract No. 20 of 1910. Subdivision of townships 64, 65 and 66, range 16 and townships 65 and 66, range 17, west of the fourth meridian. Survey of timber berth No. 1243 in townships 45 and 46, range 7, west of the fifth meridian.
Ducker, W. A...	Winnipeg, Man..	Survey of the east outlines of township 40, range 28, townships 38, 39 and 40 range 29, and townships 39 and 40, range 30, and the south outlines of townships 39, ranges 30, 31 and 32, west of the principal meridian.
Engler, C...	Ottawa, Ont..	Survey of the north boundary of Alberta across Slave river; survey of Smith Landing settlement on Slave river.
Fairchild, C. C...	Brantford, Ont..	Contract No. 27 of 1910. Subdivision of townships 63, 64, 65, 66 and part of 62, range 1, and township 65 and the east outlines of townships 67 and 68, range 2, west of the fifth meridian.
Fawcett, A...	Gravenhurst, Ont..	Contract No. 11 of 1910. Subdivision of townships 54, 55, 56 and 57, range 22, townships 57 and 58 and the east outlines of townships of 59 and 60, range 23, west of the third meridian.
Findlay, A...	Winnipeg, Man..	Contract No. 28 of 1910. Subdivision of townships 62, 63 and 64, range 2, and townships 62 and 63, range 3, west of the fifth meridian. Survey of blocks 1 and 2 of timber berth No. 1015 situated on the east shore of lake Winnipeg, near Bloodvein bay, Man., and blocks 1 and 2 of timber berth No. 1134, situated on Bloodvein river, Manitoba.
Fontaine, L. E...	Lévis, Que..	Inspection of contracts Nos. 9, 10, 16, 22, 23 and 25 of 1909; reinspection of contract No. 12 and additions to Nos. 18 and 25 of 1908. Miscellaneous resurveys in townships 55 and 56, range 7, townships 54, ranges 8 and 12 and township 52, range 22, west of the fifth meridian.
Francis, J...	Portage la Prairie, Man.	Subdivision surveys in township 45, range 20, townships 44 and 45, range 21, township 49, range 23, townships 48 and 49, range 24, and townships 48 and 50, range 25, west of the fifth meridian.

APPENDIX No. 1—Continued.

SCHEDULE of Surveyors employed and work executed by them, from April 1, 1910.
to March 31, 1911—Continued.

Surveyor.	Address.	Description of Work.
Green, T. D...	Ottawa, Ont...	Contract No. 34 of 1910. Subdivision of township 31, range 6, townships 29, 31 and 32, range 7, and township 40, ranges 8 and 9, west of the fifth meridian.
Hawkins, A. H. ...	Listowel, Ont. ...	Survey of the twenty-first base line across ranges 1 to 18, west of the fifth meridian. Miscellaneous surveys in township 29, range 7, and townships 40, ranges 8 and 9, meridian; township 45, range 4, township 48, range 22, and township 51, range 27, west of the fourth meridian. Traverse in township 58, range 11, township 53, range 25, and township 80, range 26 west of the fourth meridian; townships 47 and 52, range 1, west of the fifth meridian.
Heathcott, R. V. ...	Edmonton, Alta. ...	Contract No. 31 of 1910. Subdivision of townships 54 and 55, range 21, the south two-thirds of township 54, range 22 and the north two-thirds of townships 51, ranges 18, 19, 20, 21, 22 and 23, and survey of the east outlines of townships 56 ranges 21 and 22, west of the fifth meridian.
Holcroft, H. S. ...	Toronto, Ont. ...	Contract No. 12 of 1910. Subdivision of townships 57, 58 and 59, range 24, and townships 57, 58, 59 and 60, range 25, and survey of the east outline of township 60, range 24, west of the third meridian.
Hopkins, M. W. ...	Edmonton, Alta. ...	Contract No. 17 of 1910. Subdivision of townships 65 and 66, ranges 1, 2, 3, 4 and 5, and survey of the east outlines of townships 67 and 68, ranges 2, 3, 4, 5 and 6, west of the fourth meridian.
Hubbell, E. W. ...	Ottawa, Ont. ...	Inspection of contract No. 32 of 1907. Contracts Nos. 13, 17 and part of 19 of 1909. Contracts Nos. 4, 5, 6 and 7 of 1910. Resurvey in township 48, range 21 and township 49, range 27 west of the second meridian. Traverse in townships 42 ranges 9, 10, 13 and 14, townships 52 and 53, ranges 12 and 13, and township 49, range 26 west of the second meridian.
Johnson, A. W. ...	Kamloops, B.C. ...	Survey of villa lots at Woodhaven on north arm of Burrard Inlet.
Keith, H. P. ...	Edmonton, Alta. ...	Survey of timber berth No. 1705 in townships 50 and 51, ranges 22 and 23, west of the fifth meridian; timber berth No. 1706 in township 51, range 22, west of the fifth meridian, and of timber berth No. 1707 in township 50, range 23, west of the fifth meridian.
Kimpe, M. ...	Edmonton, Alta. ...	Contract No. 15 of 1910. Subdivision of townships 49, 50 and 51, range 8, townships 50 and 51, ranges 9 and 10, and part of township 52, range 9, and survey of the east outlines of townships 49, ranges 9, 10 and 11 west of the fifth meridian.

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APPENDIX No. 1—*Continued.*

SCHEDULE of Surveyors employed and work executed by them, from April 1, 1910, to March 31, 1911—*Continued.*

Surveyor.	Address.	Description of Work.
Kirk, J. A.	Revelstoke, B.C.	Survey of timber berth No. 401 in townships 29, ranges 21 and 22, west of the fifth meridian; timber berth No. 415 in townships 30 and 31, range 30, west of the fifth meridian, and of timber berth No. 416 in township 30, range 20 west of the fifth meridian.
Kitto, F. H.	Ottawa, Ont.	Miscellaneous resurveys in St. Albert settlement and in townships 53, ranges 25 and 26 west of the fourth meridian.
Knight, R. H.	Edmonton, Alta.	Contract No. 26 of 1910. Subdivision of townships 65, 66, 67 and 68, range 26, and townships 63, 64, 65, 66, 67 and 68, range 27, west of the fourth meridian.
Lang, J. L.	Sault Ste. Marie, Ont.	Subdivision in townships 5, 6 and 7, range 4, and townships 7 and 8, range 5, west of the fifth meridian. Resurvey in townships 5, 7 and 8, range 1, township 5, range 2, and townships 6 and 7, range 3, west of the fifth meridian.
Laurie, R. C.	Battleford, Sask.	Contract No. 35 of 1910. Subdivision of townships 54, 55 and 56, range 23, west of the third meridian.
Lighthall, A.	Ottawa, Ont.	Survey in townships 3 and 4, range 3, west of the seventh meridian; townships 18, 21, 40 and 41, east of the coast meridian; township 39, west of the coast meridian. Traverse in township 4, range 3, and township 6, range 7, west of the seventh meridian; townships 40 and 41, east of the coast meridian. Resurvey in townships 3 and 4, range 3, west of the seventh meridian; townships 18, 21, 40 and 41, east of the coast meridian; township 39, west of the coast meridian. Survey of timber berth No. 535 in township 39, west of the coast meridian; timber berth No. 536 in township 40, east of the coast meridian, and timber berth No. 537 in township 6, range 5, west of the seventh meridian.
Lonergan, G. J.	Buckingham, Que.	Inspection of contract No. 26 of 1909, and contracts Nos. 16, 17, 18, 19, 21, 23, 24 and 34 of 1910. Resurvey in township 53, range 3, township 68, range 16, township 54, range 21, township 53, range 23, and townships 54, ranges 27 and 28, west of the fourth meridian. Traverse in township 53, range 3, townships 51, ranges 6 and 7, townships 64 and 65, range 22, townships 52 and 53, range 26, and townships 53 and 54, range 27, west of the fourth meridian. Resurvey of lots 1 to 6, Lac la Biche settlement in township 68, range 16, west of the fourth meridian.
Miles, C. F.	Toronto, Ont.	Reinspection of contract No. 8 of 1909, inspection of contracts Nos. 8, 9, 10, 11, 12, 13 and 35 of 1910. Resurvey in township 49, range 24 and townships 48, ranges 27 and 28 west of the second meridian; township 48, range 1, townships 14 and 15, range 25, and

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APPENDIX No. 1—*Continued.*

SCHEDULE of Surveyors employed and work executed by them, from April 1, 1910, to March 31, 1911—*Continued.*

Surveyor.	Address.	Description of Work.
		townships 13 and 14, range 30, west of the third meridian; townships 13 and 14, range 1, west of the fourth meridian. Traverse in townships 48 and 49, range 24, and townships 48, ranges 27 and 28, west of the second meridian; township 15, range 25, west of the third meridian; townships 13 and 14, range 1, west of the fourth meridian.
Mitchell, B. F.	Edmonton, Alta.	Contract No. 21 of 1910. Subdivision of township 63, range 16, and townships 61, 62, 63 and 64, range 17, west of the fourth meridian.
Montgomery, R. H. . . .	Prince Albert, Sask. . . .	Contract No. 5 of 1910. Subdivision of township 51, range 5, townships 51 and 52, range 6, townships 50, 51, 52 and 53, range 7, and townships 49, 50, 51 and 52, range 8, west of the third meridian.
Morrier, J. E.	Ottawa, Ont.	Contract No. 4 of 1910. Subdivision of townships 44, ranges 7, 8, 9 and 10, and the northerly two-thirds of township 45, range 3, west of the second meridian.
McCaw, R. D.	Calgary, Alta.	Examination of land in the Kamloops district for the purpose of classification into fruit land, farming land, grazing land, timber land and worthless land.
McFarlane, J. B.	Toronto, Ont.	Subdivision in townships 39 and 40, range 16, township 39, range 17, township 40, range 18, township 41, range 19, township 44, range 21, townships 45 and 46, range 22, township 46, range 23, and township 50, range 26, west of the fifth meridian.
McFarlane, W. G.	Toronto, Ont.	Contract No. 33 of 1910. Subdivision of township 83, range 23, and the parts north of Peace river of townships 83, ranges 21 and 22, and township 82, range 23, survey of the east outlines of townships 84, ranges 22, 23 and 24, all west of the fifth meridian. Subdivision of townships 81 and 82, range 1, townships 81 ranges 2 and 3, township 70, range 9, the west half of township 72 and the northerly two-thirds of the west half of township 71, range 2, the northerly two-thirds of township 70, and the southerly third of townships 71, ranges 7 and 8, and the southerly third of township 71, range 9; survey of the north outline of township 84, range 1, and the east outlines of townships 83 and 84, range 2, and townships 69, ranges 7, 8 and 9, all west of the sixth meridian. Traverse in township 82, range 26, west of the fifth meridian, and in township 71, range 3, west of the sixth meridian. Survey of blocks 1 and 2 of timber berth 1272 in Peace river district, Alberta.
McGrandle, H.	Wetaskiwin, Alta.	Contract No. 29 of 1910. Subdivision of townships 52, ranges 13 and 14, township 56, range 15, townships 55 and 56, and the north third of township 54, range 16, west of the fifth meridian.

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APPENDIX No. 1—*Continued.*

SCHEDULE of Surveyors employed and work executed by them, from April 1, 1910,
to March 31, 1911—*Continued.*

Surveyor.	Address.	Description of Work.
McMillan, Geo.	Ottawa, Ont.	Survey of the sixteenth base line across ranges 5 to 13, the seventeenth base line across ranges 9 to 14, and the twentieth base line across ranges 13 to 17, west of the sixth meridian.
McNaughton, A. L. . . .	Cornwall, Ont.	Subdivision in townships 45 and 46, range 18, townships 46 and 47, range 19, township 47, range 20, townships 48 and 49, range 21, township 49, range 22, and survey of the east outlines of townships 48, ranges 19 and 20, west of the fifth meridian. Survey of timber berth No. 1709 in township 53, range 10, west of the fifth meridian.
Ogilvie, W.	Ottawa, Ont.	Survey of a water-power site for the city of Prince Albert, at Cole falls, on Saskatchewan river.
O'Hara, W. F.	Ottawa, Ont.	Resurvey in townships 2 ranges 7, 8 and 19, townships 1 and 2, range 20, township 1, range 27, townships 1 and 2, range 29, and township 1, range 30, west of the fourth meridian. Survey in the town of Pincher Creek and of villa lots around Waterton lakes.
Ord, L. R.	Hamilton, Ont.	Contract No. 22 of 1910. Subdivision of townships 61, 62, 63, 64 and 65, range 18, west of the fourth meridian. .
Phillips, H. G.	Saskatoon, Sask.	Resurvey in township 23, range 7, west of the third meridian.
Plunkett, T. H.	Toronto, Ont.	Survey in townships 19 and 20, range 5, townships 19, ranges 6 and 7, townships 23, ranges 9 and 10, townships 22 and 23 range 11, township 23, range 12, townships 21, 22 and 23, range 13, townships 22 and 23, range 25. Traverse in townships 19 and 20, range 5, and townships 21, 22 and 23, range 13, west of the sixth meridian. Resurvey in township 23, range 10, townships 22 and 23, range 11, township 23, range 12, townships 21 and 23, range 13, townships 21, ranges 14 and 24, and townships 22 and 23, range 25, west of the sixth meridian.
Ponton, A. W.	Edmonton, Alta.	Survey of the fifth meridian from the northeast corner of township 106 to the northeast corner of township 112; survey of the twenty-eighth base line across ranges 1 to 17, the twenty-ninth base line across range 1, part subdivision of township 109, range 10, west of the fifth meridian, and the production of the principal meridian across lake Winnipeg from the northeast corner of section 12, township 35, to the northeast corner of township 48.
Proudfoot, H. B.	Saskatoon, Sask.	Survey of block 24 of timber berth No. 1048 near Green lake, berth No. 1050 on the shores of Namew lake, Goose lake and Amisk lake, blocks 1 and 2 of berth No. 1237 northeast of Hudson Bay Junction and berth No. 1672 in township 43, range 27, west of the principal meridian.

APPENDIX No. 1—Continued.

SCHEDULE of Surveyors employed and work executed by them, from April 1, 1910, to March 31, 1911—Continued.

Description of Work.	Surveyor.	Address.
Reilly, W. R.	Regina, Sask.	Traverse of Swan lake in township 10, range 8, west of the second meridian.
Robinson, E. W.	Ottawa, Ont.	Survey of the eighth base line across ranges 1 to 5, east of the principal meridian; survey of the principal meridian from the eighth base line to lake Winnipeg; survey of the ninth base line across ranges 1 to 7, west of the principal meridian; survey of the fifteenth base line from the northeast corner of section 35, range 21, west of the principal meridian to the second meridian; survey of the second meridian from the fifteenth base line to the northeast corner of township 61.
Rolfson, O.	Walkerville, Ont.	Subdivision in townships 43 and 44, range 20, and township 44, range 21, west of the fifth meridian.
Ross, J. E.	Kamloops, B.C.	Survey in townships 19, ranges 13 and 14, township 22, range 17, townships 17, 18, 19, 21 and 22, range 18, townships 21 and 22, range 19, townships 21, 22, 23 and 24 range 20, townships 19, 22, 23 and 24, range 21, townships 19, 20, 22 and 23, range 22, and township 20, range 23, west of the sixth meridian. Traverse in township 22, range 17, townships 18, 19 and 22, range 18, township 21, range 19, township 22, range 20, and townships 22, 23 and 24, range 21, west of sixth meridian. Resurvey in township 22, range 17, townships 18, 20 and 21, range 18, townships 20 and 21, range 19, township 24, range 21, and township 22, range 22, west of the sixth meridian.
Roy, G. P.	Quebec, Que.	Contract No. 8 of 1910. Subdivision of townships 53, 54 and 55, range 17, and townships 53, 54, 55 and 56, range 18; survey of the east outline of township 56, range 17, west of the third meridian.
Saint Cyr, A.	Ottawa, Ont.	Survey of the third meridian from the northeast corner of township 60 to the northeast corner of township 64, and the seventeenth base line across ranges 1 to 12, west of the third meridian.
Saunders, B. J.	Edmonton, Alta.	Survey of the nineteenth base line across ranges 1 to 5, west of the fourth meridian.
Scott, W. A.	Galt, Ont.	Surveys in township 10, range 30, west of the fourth meridian; township 10, range 1, townships 11 and 13, range 2, township 8, range 3, and townships 10, 11 and 12, range 4, west of the fifth meridian. Resurvey in township 28, range 12, and township 16, range 13, west of the third meridian. Traverse in townships 27, ranges 17 and 18, west of the second meridian, and in townships 10 and 11, range 3, west of the fifth meridian. Survey of the north boundary of Peigan timber limit in township 9, range 30, west of the fourth meridian. Investigation in township 7, range 10 west of the second meridian.

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APPENDIX No. 1—*Continued.*

SCHEDULE of Surveyors employed and work executed by them, from April 1, 1910, to March 31, 1911—*Continued.*

Surveyor.	Address.	Description of work.
Selby, H. W.	(Died Aug., 1910)	Settlement surveys at Athabaska Landing and McMurray. Traverse of part of Athabaska river from McMurray to McKay.
Seymour, H. L. . . .	Edmonton, Alta. . . .	Contract No. 23 of 1910. Subdivision of townships 61, 62 and 63, ranges 19 and 20, west of the fourth meridian.
Smith, D. A.	Claude, Ont.	Survey in township 25 range 20, west of the fifth meridian; townships 24, 25 and 26, range 7, and townships 25 and 26, range 8, west of the sixth meridian. Traverse in townships 25, ranges 7 and 8, west of the sixth meridian. Resurvey in township 25, range 20, west of the fifth meridian.
Smith, J. H.	Edmonton, Alta. . . .	Contract No. 32 of 1910. Subdivision of township 77, range 19, township 76, and the north third of township 75, ranges 20 and 21, and townships 76 and 77, and the north third of township 75, ranges 22 and 23, west of the fifth meridian.
Steele, I. J.	Ottawa, Ont.	Contract No. 25 of 1910. Subdivision of townships 64, 65, 66, 67 and 68, range 25, and township 64, range 26, west of the fourth meridian.
Stewart, L. D. N.	Collingwood, Ont.	Survey in townships 22 and 23, ranges 9 and 10, west of the sixth meridian. Traverse in township 23, range 9, and townships 22 and 23, range 10, west of the sixth meridian. Resurvey in township 23, range 9, west of the sixth meridian.
Stewart, W. M.	Saskatoon, Sask. . . .	Contract No. 9 of 1910. Subdivision of townships 54, 55, 56 and 57, range 19, and townships 57, ranges 20 and 21, west of the third meridian.
Stock, J. J.	Ottawa, Ont.	Contract No. 10 of 1910. Subdivision of townships 54, 55 and 56, ranges 20 and 21, west of the third meridian.
Street, P. B.	Toronto, Ont.	Survey in township 27, range 21, and townships 27 and 28, range 22, west of the fifth meridian; townships 22 and 23, range 1, townships 22, 23 and 24, range 2, and townships 26, ranges 7 and 8, west of the sixth meridian. Traverse in township 22, range 1, townships 22 and 24, range 2 and townships 26, ranges 7 and 8, west of the sixth meridian. Resurvey in townships 27, ranges 21 and 22, west of the fifth meridian; townships 22 and 23, range 1, and townships 26, ranges 7 and 8, west of the sixth meridian.
Teasdale, C. M.	Concord, Ont.	Contract No. 3 of 1910. Subdivision of townships 44, 46, 47, 48 and the north third of 45, range 11, west of the second meridian.
Thibault, W.	Montreal, Que. . . .	Reconnaissance survey of Winnipeg and English rivers to determine the most suitable locations for storage reservoirs.

2 GEORGE V., A. 1912

APPENDIX No. 1.—*Concluded.*

SCHEDULE of Surveyors employed and work executed by them, from April 1, 1910, to March 31, 1911.—*Concluded.*

Surveyor.	Address.	Description of work.
Tyrrell, J. W.	Hamilton, Ont.	Contract No. 2 of 1910. Subdivision of townships 26, 27, 29 and 30, range 1, townships 26, 27, 28, 29 and 30, range 2, and townships 26, ranges 3 and 4, east of the principal meridian.
Waddell, W. H.	Edmonton, Alta.	Contract No. 16 of 1910. Subdivision of townships 65 and the south two-thirds of townships 66, ranges 10, 11 and 12, and townships 69, ranges 13 and 14, west of the fourth meridian. Survey of timber berth No. 1305 in townships 60 and 61, ranges 11 and 12, west of the fifth meridian.
Waldron, J.	Moosejaw, Sask.	Contract No. 18 of 1910. Subdivision of townships 68 and 69, ranges 18, 19 and 20, west of the fourth meridian.
Wallace, J. N.	Calgary, Alta.	Survey of the fourth meridian from the northeast corner of township 80 to the northeast corner of section 13, township 95.
Warren, Jas.	Walkerton, Ont.	Contract No. 7 of 1910. Subdivision of townships 52 and 53, range 14, township 53, range 15, and townships 53 and 54, range 16, west of the third meridian.
Watt, G. H.	Ottawa, Ont.	Contract No. 6 of 1910. Subdivision of townships 48 and 49, range 10, township 49, range 11, townships 50 and 51, ranges 12 and 13, and survey of the east boundary of township 52, range 12, west of the third meridian.
Williams, G. L.	Enderby, B.C.	Survey of blocks 4 and 5 of timber berth No. 253, near Revelstoke, B.C.
Woods, J. E.	Pincher Creek, Alta.	Traverse of Southfork river in township 6, range 3, west of the fifth meridian.

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APPENDIX No. 2.

SCHEDULE showing for each surveyor employed from April 1, 1910, to March 31, 1911, the number of miles surveyed of township section lines, township outlines, traverses of lakes and rivers and resurvey, also the cost of the same.

Surveyor.	Miles of Section Lines.	Miles of Outlines.	Miles of Traverse.	Miles of Resurvey.	Total Mileage.	Total Cost.	Cost per Mile.	By Day Work or by Contract.
						\$	\$	
Akins, J. R.....	82	18	9	11	120	8,662	72 19	Day.
Aylsworth, C. F.....	26		1	185	212	9,652	45 53	"
Baker, J. C.....	362	45	122		529	13,911	26 29	Contract.
Blanchet, G. H.....	87		18	32	137	13,649	99 63	Day.
Bridgland, M. P.....			23	31	54	1,378	25 52	"
Carson, P. A.....			40	123	163	4,302	26 39	"
Cautley, R. H.....	328	61		11	400	12,533	31 33	Contract.
Chilver, C. A.....	281	18	62		361	9,830	27 23	"
Christie, W.....		126			126	14,414	114 40	Day.
Coté, J. L.....	272	18	63		353	9,883	28 00	Contract.
Cumming, A. L.....	126	22	109		257	13,230	51 48	Day.
Davies, T. A.....	286	30	36	3	355	10,171	28 65	Contract.
Deans, W. J.....	100		31	31	162	10,802	66 68	Day.
Ducker, W. A.....	17	32			49	4,785	97 65	"
Dumais, P. T. C.....	234		132		366	8,487	23 19	Contract.
Fairchild, C. C.....	257	44	64	9	374	10,458	27 96	"
Fawcett, A.....	288	30	71		389	10,148	26 09	"
Findlay, A.....	247	18	47		312	8,587	27 52	"
Francis, J.....	106	21	30		157	11,037	70 30	Day.
Green, T. D.....	278		46		324	9,045	27 91	Contract.
Hawkins, A. H.....		109	13	25	147	14,519	98 77	Day.
Heathcott, R. V.....	327	58	41		426	12,824	30 10	Contract.
Holcroft, H. S.....	391	51	144		496	12,455	25 11	"
Hopkins, M. W.....	466	117	62		645	17,107	26 52	"
Kimpe, M.....	363	54	80		497	13,861	27 89	"
Knight, R. H.....	290	36	60		386	10,653	27 60	"
Lang, J. L.....	51	2	3	33	89	7,807	87 72	Day.
Laurie, R. C.....	146	18	51		215	5,222	24 29	Contract.
Lighthall, A.....	47		18	9	74	9,237	124 82	Day.
Mitchell, B. F.....	247	24	71		342	9,073	26 53	Contract.
Montgomery, R. H.....	480	50	197		727	18,140	24 95	"
Morrier, J. E.....	202		65		267	6,788	25 42	"
McFarlane, J. B.....	90	47	17	3	157	13,333	84 92	Day.
McFarlane, W. G.....	537	99	91	48	775	18,224	23 51	Contract.
McGrandle, H.....	252	9	2		263	7,933	30 16	Contract.
McMillan, Geo.....		114			114	28,472	249 75	Day.
McNaughton, A. L.....	93	40	11		144	14,152	98 28	"
O'Hara, W. F.....	24		10	237	271	8,015	29 58	"
Ord, L. R.....	234		88		322	7,780	24 16	Contract.
Plunkett, T. H.....	113		25	32	170	12,063	70 96	Day.
Ponton, A. W.....	4	225		2	231	28,625	123 92	"
Robinson, E. W.....	14	199		1	214	22,186	103 67	"
Rolfson, O.....	63	14	25	4	106	13,350	125 94	"
Ross, J. E.....	146		22	6	174	10,568	60 74	"
Roy, G. P.....	326	38	53		422	12,522	29 67	Contract.
Saint Cyr, A.....	22	85			107	26,833	250 77	Day.
Saunders, B. J.....		30			30	23,160	772 00	"
Scott, W. A.....	61	6	7	29	103	7,677	74 53	"
Seymour, H. L.....	288	30	50		368	10,345	28 11	Contract.
Smith, D. A.....	70		6	16	92	10,218	111 06	Day.
Smith, J. H.....	392	58	55		505	14,500	28 71	Contract.
Steele, I. J.....	276	12	87		375	9,544	25 45	"
Stewart, L. D. N.....	69		13	9	91	9,915	108 96	Day.
Stewart, W. M.....	288	54	15		357	10,866	30 44	Contract.
Stock, J. J.....	286	36	24		346	10,056	29 07	"
Street, P. B.....	76		19	16	111	9,283	83 63	Day.

APPENDIX No. 2.—Concluded.

SCHEDULE showing for each surveyor employed from April 1, 1910, to March 31, 1911, the number of miles surveyed of township section lines, township outlines, traverses of lakes and rivers and resurvey, also the cost of the same.—Concluded

Surveyor.	Miles of Section Lines.	Miles of Outlines.	Miles of Traverse.	Miles of Resurvey.	Total Mileage.	Total Cost.	Cost per Mile.	By Day Work or by Contract.
						\$	\$ cts.	
Teasdale, C. M	202	18	14	.....	234	7,042	30 10	Contract.
Tyrrell, J. W.....	468	44	46	.....	558	15,528	27 83	"
Waddell, W. H.....	326	48	196	.....	570	13,345	23 41	"
Waldron, J.....	273	18	71	.....	362	9,971	27 55	"
Wallace, J. N... ..		88	.....	.....	88	27,065	307 56	Day.
Warren, Jas.....	214	32	24	.....	270	7,687	28 47	Contract.
Watt, G. H.....	345	30	61	436	11,958	27 43	"
Woods, J. E.....			12	12	211	17 58	Day.
Total.....	11,849	2,376	2,758	906	17,889	765,077		

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APPENDIX No. 3.

List of lots in the Yukon Territory, survey returns of which have been received from April 1, 1910, to March 31, 1911.

GROUP No. 1.

Lot No.	Acres.	Surveyor.	Year of Survey.	Date of Approval.	Claimant.	Remarks.
45	346 86	U. S. W. Barwell.....	1909.....	Dec. 12, 1910....	Northern Light, Power and Coal Co..	Right of way for Transmission Line.

GROUP No. 2.

11	18 86	James Gibbon.....	1910	May 26, 1910....	N. A. T. and T. Co.....	Surface Resurvey.
25	5 00	"	1910.	Nov. 25, 1910....	W. E. Sprague.....	Surface Block 35.
381	50 4	"	1907	Nov. 25, 1910....	E. Nichol et al.....	"Oro" Mineral Claim.
382	44 5	"	1907	Nov. 25, 1910....	E. Nichol et al.....	"Bernice" Mineral Claim.
390	51 65	"	1908	Feb. 23, 1911....	Agnes J. Kinsey.....	"Clara" " "
419	43 56	"	1909	July 15, 1910....	Jas. J. Lloyd.....	"Sunrise" " "
439	51 64	"	1909	Nov. 25, 1910....	Jas. Cameron et al.....	"Hunker" " "
440	51 65	"	1909	Feb. 23, 1911....	Malcolm John Campbell et al.....	"Kitchener" " "
441	40 7	"	1909	Feb. 23, 1911....	Malcolm John Campbell et al.....	"Roberts" " "
417	36 5	"	1909	Feb. 23, 1911....	Jas. Cameron et al.....	"Summit" " "
448	47 74	"	1910	Nov. 25, 1910....	Chas. Launder et al.....	"Rattler" " "
449	32 83	"	1909	Nov. 25, 1910....	Jas. Cameron et al.....	"Le Roy" " "
453	38 58	"	1909	Nov. 25, 1910....	James Cameron.....	"Florodora" " "
454	41 32	"	1909	June 2, 1910....	Malcolm John Campbell et al.....	"Eureka" " "
455	44 23	"	1909	Nov. 25, 1910....	Otto F. Kastner.....	"Dawson" " "
459	51 65	"	1909	Nov. 25, 1910....	James Cameron et al.....	"Calumet" " "
460	42 7	"	1909	June 6, 1910....	F. H. Elliott.....	"Welcome" " "
465	35 2	"	1909	June 6, 1910....	James Richard Irvine.....	"Dundas" " "
466	42 53	"	1909	Feb. 23, 1911....	Chas. Launder et al.....	"Eclipse" " "
467	19 38	"	1909	Nov. 25, 1910....	Robert Greaves et al.....	"Franklin" " "
476	11 35	"	1909	Nov. 25, 1910....	Malcolm John Campbell.....	"Gold Run" " "
477	51 56	"	1910	Nov. 25, 1910....	W. O. Smith.....	"Golden Age" " "
478	29 8	"	1910	Feb. 23, 1911....	H. H. Honnon et al.....	"Kenwood" " "
479	5 1	"	1910	Dec. 21, 1910....	Joseph Albert Segher.....	"Mary" Fractional Mineral
480	9 3	"	1910	Dec. 21, 1910....	Joseph Albert Segher.....	"Rebecca" " "
481	31 1	"	1910	Feb. 23, 1911....	H. H. Honnon et al.....	"Silver Knight" Mineral Claim.
482	32 7	"	1910	Feb. 23, 1911....	H. H. Honnon et al.....	"Tiger No. 2" " "
483	44 9	"	1910	Nov. 25, 1910....	Joseph Albert Segher.....	"Broken Hill" " "
484	69 2	"	1910	.....	Northern Light and Power Co.	"Right of Way" " "
503	36 69	N. A. Barwash.....	1909	June 15, 1910....	J. H. McConnell.....	"Primrose" " "
504	27 53	"	1909	Nov. 25, 1910....	Jane S. Orrell et al.....	"Review" " "

APPENDIX No. 3 *Continued*

List of lots in the Yukon Territory, survey returns of which have been received from April 1, 1910 to March, 31, 1911—*Continued.*

GROUP No. 2 *Continued.*

Lot. No.	Acres.	Surveyor.	Year of Survey.	Date of Approval.	Claimant.	Remarks.
505	44.41	"	1909	June 10, 1910	Jane S. Orrell et al.	"Central" Mineral Claim.
506	50.34	"	1909	June 10, 1910	Jane S. Orrell et al.	"Yellow Jacket" "
507	47.74	N. A. Burwash	1909	June 10, 1910	James Lloyd et al.	"Exchange" "
508	51.65	"	1909	June 10, 1910	"	"Rosaline" "
510	43.76	"	1909	June 10, 1910	M. Campbell.	"Empire" "
511	51.65	"	1909	June 10, 1910	A. A. Knorr	"Fearless" "
512	32.90	"	1909	June 10, 1910	G. H. Lawrence et al.	"Mountain Maid" "
513	50.16	"	1909	Nov. 25, 1910	D. R. Marshall.	"Maple Leaf" "
514	35.95	"	1909	June 10, 1910	David Bauer.	"Pacific" "
515	26.00	"	1909	June 10, 1910	Jane S. Orrell et al.	"Tiger" "
516	51.65	"	1909	June 10, 1910	J. J. Lloyd et al.	"B. C." "
517	50.71	"	1909	May 31, 1910	"	"Deadwood" "
518	51.65	"	1909	May 31, 1910	"	"Doloris" "
519	48.67	"	1909	May 31, 1910	"	"O. K." "
520	25.03	"	1909	June 10, 1910	Joseph Fournier	"Belle chasse" "
521	17.19	"	1909	June 10, 1910	Louis Martin et al.	"Chicoutimi" "

GROUP No. 5.

163	50.29	H. G. Dickson	1909	Nov. 25, 1910	D. C. Campbell	"Bell" Mineral Claim.
164	49.28	"	1909	Nov. 25, 1910	Dan Gilles	"Little May" Mineral Claim.
165	44.93	"	1909	Nov. 25, 1910	R. Unsworth.	"Caroline" "
166	10.68	"	1909	Nov. 25, 1910	Gilbert Fowler.	"Black Diamond" "
167	83.72	"	1909	Aug. 7, 1910	A. B. Palmer	"Palmer No. 1" "
168	30.10	"	1909	Aug. 7, 1910	"	"Skookum" "
169	29.02	"	1910	Aug. 7, 1910	Ernest Burwash.	"Ruby" "
172	51.59	"	1910	Nov. 29, 1910	C. H. Johnston	"Grafton Annex" "
189	51.21	N. A. Burwash.	1909	June 10, 1910	L. V. Wilson	"Everett" "
197	155.67	"	1910	"	H. K. Burwash	"Real Thing" "
198	47.03	"	1910	June 10, 1910	D. Ross	"Rothsay" "

GROUP NO. 6.

60	9-82	H. G. Dickson	1909	Nov. 25, 1910	W. S. McGee.	"Blue Grouse" Mineral Claim.
104	51-65	"	1909	Nov. 25, 1910	H. E. Porter.	"Empire"
105	160-00	"	1909	Nov. 25, 1910	"	Surface lot.
106	34-63	"	1909	Nov. 25, 1910	"	"Excelsior" Mineral Claim.
107	51-65	"	1909	Nov. 25, 1910	"	"Porter"
109	51-65	"	1909	Nov. 25, 1910	Edward A. Dixon.	"Evening"
110	50-19	"	1909	July 7, 1910	T. H. Kernish.	"Little Jack"
111	45-94	"	1909	Nov. 25, 1910	Samuel F. Chambers.	"Shamrock"
112	51-65	"	1910		H. W. Vance	"North Star"
113	51-53	"	1910		"	"Lucky Ell"
114	51-22	"	1910		Elvin J. Edwards.	"Venus No. 3"

GROUP No. 10.

18	47-37	H. G. Dickson	1910	Angus S. Fraser	"Remy" Mineral Claim.
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APPENDIX No. 4.

LIST of miscellaneous surveys in the Yukon Territory, returns of which have been received from April 1, 1910, to March 31, 1911.

Year.	Surveyor.	Description of Survey.
1910....	H. G. Dickson....	Reference traverse from Carmack up Nordenskiold valley.
1906....	James Gibbon....	Base line on Guysboro gulch, a tributary of Klondike river.
1906....	"	" " on Belcher " " " "
1906....	"	" " on Rabbit " " " "
1906....	"	" " on Twenty " " Hunker Creek.
1906....	"	" " on Twenty-one " " " "
1906....	"	" " on Hattie " " " "
1906....	"	" " on Thirty-seven " " " "
1907....	"	Base and side lines on part of Sixtymile river, a tributary of Yukon river.
1907....	"	" " " " on Bedrock creek, a tributary of Sixtymile river.
1907....	"	" " " " on Big Gold creek, a tributary of Sixtymile river.
1907....	"	" " " " on Glacier creek, a tributary of Big Gold creek.
1910....	C. W. MacPherson	Base line on Goring gulch, a tributary of Klondike river.

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APPENDIX No. 5.

STATEMENT of work executed in the office of the Chief Draughtsman:—

Letters of instructions to surveyors..	335
Progress sketches received and filed..	1,206
Declarations of settlers received and filed..	123
Returns of timber berths received..	48
Plans received from surveyors..	509
Field books received from surveyors..	760
Timber reports received..	278
Observations for magnetic declination received..	987
Dip observations received..	94
Total force observations received..	72
Preliminary township plans prepared..	355
Sketches made..	4,033
Maps and tracings made..	134
Plans of Yukon lots received..	71
Plans of miscellaneous Yukon surveys received..	13
Yukon lots reduced to 40 chains to 1 inch and plotted on group plans..	45
Returns of surveys examined—	
Township subdivision..	372
Township outline..	260
Road plans..	229
Railway plans..	55
Yukon lots..	118
Miscellaneous Yukon surveys..	21
Mineral claims	16
Timber berths..	64
Correction and other miscellaneous surveys..	165
Township plans compiled..	918
Topographical township plans compiled	156
Townsite, settlement and other plans compiled..	15
Proofs of plans examined..	108
Township plans printed..	740
Townsite and settlement plans printed..	13
Miscellaneous plans printed..	197
Descriptions written..	13
Pages of field notes copied..	627
Applications for various information dealt with..	2,863
Files received and returned..	2,469
Letters and memoranda drafted..	8,355
Books received from Record Office and used in connection with office work..	4,969
Books returned to Record Office..	4,869
Plans other than printed township plans received from Record Office and used in connection with office work..	654
Plans returned to Record Office..	673

APPENDIX No. 5.—*Concluded.*

Volumes of plans received from Record Office and used in connection with office work..	92
Volumes of plans returned to Record Office..	85
Books sent to Record Office to be placed on record..	772
Plans other than township plans sent to Record Office to be placed on record..	273
Sectional maps (3 miles to 1 inch)—	
Revised..	56
Reprinted..	38
Sectional maps (6 miles to 1 inch)—	
Reprinted..	46

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APPENDIX No. 6.

LIST of new editions of Sectional Maps issued from April 1, 1910, to March 31, 1911.
SCALE 3 MILES TO ONE INCH.

No.	Name.	No.	Name.	No.	Name.	No.	Name.
15	Lethbridge.	115	Blackfoot.	172	Fairford.	313	Brulé.
16	Milk River.	116	Rainy Hills.	215	Red Deer.	314	St. Ann.
17	Cypress.	117	Red Deer Forks.	217	Tramping Lake.	315	Edmonton.
19	Willowbunch.	118	Rush Lake.	218	Saskatoon.	317	Fort Pitt.
20	Souris.	162	Seymour.	219	Humboldt.	364	Fort Assiniboine.
66	Medicine Hat.	164	Morley.	220	Nut Mt.	365	Victoria.
67	Maple Creek.	166	Sounding Creek.	263	Jasper.	415	Tawatinaw.
69	Moosejaw.	167	Bad Hills.	265	Peace Hills.	416	La Biche.
73	Winnipeg.	168	The Elbow.	267	Battleford.		
113	Spillimacheen.	171	Duck Mt.	269	Carlton.		

SCALE 6 MILES TO ONE INCH.

No.	Name.	No.	Name.	No.	Name.	No.	Name.
14	Pincer Creek.	74	Cross Lake.	168	The Elbow.	313	Brulé.
15	Lethbridge.	113	Spillimacheen.	171	Duck Mt.	314	St. Ann.
16	Milk River.	115	Blackfoot.	172	Fairford.	315	Edmonton.
17	Cypress.	116	Rainy Hills.	215	Red Deer.	316	Vermilion.
19	Willowbunch.	117	Red Deer Forks.	216	Sullivan Lake.	317	Fort Pitt.
22	Dufferin.	120	Qu'Appelle.	217	Tramping Lake.	364	Fort Assiniboine.
66	Medicine Hat.	164	Morley.	220	Nut Mt.	365	Victoria.
67	Maple Creek.	165	Rosebud.	263	Jasper.	415	Tawatinaw.
68	Swiftcurrent.	166	Sounding Creek.	264	Brazeau.	416	La Biche.
73	Winnipeg.	167	Bad Hills.	265	Peace Hills.		

APPENDIX No. 7.

STATEMENT of work executed in the Photographic Office from April 1, 1910, to March 31, 1911.

	3 1/2 x 3 1/2	3 1/2 x 5 1/2	5 x 7	8 x 10	10 x 12	11 x 14	16 x 18	18 x 20	20 x 24	24 x 30	30 x 36	36 x 42	42 x 48	
Dry plate negatives						24								1,540
Bromide prints		830	684	2		45	120	67				37	2	471
Sollio prints		13	35	29	31	32			26	20	46			6,802
Velox prints		1,923	4,373	473	1	76								4,770
Artura prints		3,438	1,256			44								1,867
Vandyke prints			1,595	228										749
Blue prints			43	9	10	113	73	186	121	50	51	79	14	426
Lantern transparencies				4	32	17	34	51	66	125	18	58	21	465
Photographs mounted	465													896
Wet plate negatives		495	282	60		171	59							1,435
Photo-litho plates				83			986	159	36					1,142
								1134	8					
Totals	465	6,699	8,268	888	74	522	1,272	1,597	257	195	115	174	37	20,563

APPENDIX No. 8.

STATEMENT of work executed in the Lithographic Office from April 1, 1910, to March 31, 1911.

Month.	Maps.			Townships.			Forms.		
	No.	Copies.	Im-pressions.	No.	Copies.	Impres-sions.	No.	Copies.	Impres-sions.
April..... 1910	9	8,085	22,190	.....	.....	.....	4	339	339
May..... "	22	191,125	716,575	63	12,600	13,800	3	1,070	1,070
June..... "	16	6,811	7,036	138	27,600	27,800	.....	.....	.....
July..... "	4	900	900	12	2,400	2,400	2	700	700
August..... "	15	6,725	11,750	.....	.....	.....	9	11,475	11,725
September..... "	5	2,075	2,225	75	15,000	15,000	5	3,380	3,480
October..... "	23	9,500	9,575	96	19,200	20,300	6	1,590	1,590
November..... "	30	11,800	11,875	164	32,800	33,000	7	11,635	11,635
December..... "	4	725	725	.....	.....	.....	1	300	300
January..... 1911	5	935	1,145	51	10,200	10,200	6	7,130	9,630
February..... "	11	73,075	205,025	20	3,804	4,204	7	25,200	25,200
March..... "	17	107,650	284,475	121	24,200	24,200	5	10,700	12,700
Total.....	161	419,406	1,273,496	740	147,804	150,904	55	73,519	78,369

RECAPITULATION.

	No.	Copies.	Impressions.	Cost.
				\$ cts.
Maps.....	161	419,406	1,273,496	3,356 68
Townships.....	740	147,804	150,904	5,301 20
Forms.....	55	73,519	78,369	1,032 12
Grand total.....	956	640,729	1,502,769	9,690 00

APPENDIX No. 9.

List of employees of the Topographical Surveys Branch at Ottawa, giving the name, classification, duties of office and salary of each. (Metcalf street, corner of Slater.)

Name.	Classification.		Duties of Office.	Salary.
	Division.	Sub-division.		
				\$
Deville, E., D.T.S., LL.D.....	1	A	Surveyor General.	3,550
			Correspondence.	
Brady, M.	1	B	Secretary.	2,300
Cullen, M. J.	3	A	Stenographer.	1,200
Moran, J. F.	3	A	Typewriter and clerk.	900
Williams, E. R.	3	A	Correspondence clerk.	900
Addison, W. G.	3	B	Typewriter.	750
Pegg, A.			Messenger.	800
O'Meara, M. T.			"	500
Pick, A. C.			"	500
			Accounts.	
Hunter, R. H.	2	A	Accountant.	2,050
Wilkinson, Percy	3	A	Asst. Accountant.	1,050

Chief Draughtsman's Office—General direction and supervision of the technical work.

Symes, P. R.	1	B	Chief draughtsman.	2,350
Shanks, T., B.A.Sc., D.L.S.	1	B	Asst. chief draughtsman.	2,450

SESSIONAL PAPER No. 25b

APPENDIX No. 9.—Continued.

Chief Draughtsman's Office, First Section—Survey instructions and general information.

Name.	CLASSIFICATION.		Duties of Office.	Salary.
	Division	Sub-division.		
				\$ cts.
Brown, T. E., B.A.	1	B	Chief of section ..	2,450 00
Umbach, J. E., Grad. S.P.S., D.L.S.	2	A	Asst. chief of section ..	1,850 00
Barber, H. G., Grad. S.P.S.	2	A	" "	1,850 00
Rice, F. W., Grad. School of Mining.	2	A	" "	1,850 00
Belleau, J. A., D.L.S.	2	A	" "	1,950 00
Sylvain, J.	2	A	" "	1,650 00
McRae, A. D., B.A., B. Sc.	2	B	Draughtsman ..	1,350 00
Carroll, M. J., Grad. S.P.S.	2	B	" ..	1,550 00
Grant, A. W., B.A.	2	B	" ..	1,350 00
Peaker, W. J., Grad. S.P.S.	2	B	" ..	1,250 00
Grant, A. M., B. Sc.	2	B	" ..	1,250 00
Milliken, J. B., B.A., B. Sc.	2	B	" ..	1,250 00
MacMillan, J. P., B.E.	2	B	" ..	1,250 00
Cordukes, J. P., B. Sc.	2	B	" ..	1,150 00
Wadlin, L. N., B. Sc.	2	B	" ..	1,150 00
Hayward, H. E., B. Sc.	2	B	" ..	1,250 00
McCully, R. C., B.A.	2	B	" ..	1,000 00
Gagnon, J. N. H., B.A. S.	2	B	" ..	1,000 00
Rochon, E. C.	2	B	" ..	1,350 00
Holbrook, C. H.	3	A	Clerk ..	950 00
Burkholder, E. L.	3	A	" ..	900 00

Chief Draughtsman's Office, Second Section—Surveys in Manitoba, Saskatchewan, Alberta and Yukon.

Name.	CLASSIFICATION.		Duties of Office.	Salary.
	Division	Sub-division.		
				\$ cts.
Nash, T. S., Grad. S.P.S., D.L.S.	1	B	Chief of section..	2,400 00
Burgess, E. L., Grad. S.P.S., D.L.S., O.L.S.	2	A	Asst. chief of section.	1,850 00
Dennis, E. M., B. Sc.	2	A	" "	1,850 00
Elder, A. J., Grad. S.P.S., D.L.S.	2	A	" "	1,850 00
Henderson, F. D., Grad. S.P.S., D.L.S.	2	A	" "	1,850 00
Hill, S. N., Grad. S.P.S.	2	A	" "	1,850 00
Genest, P. F. X., Q.L.S.	2	A	" "	1,850 00
Robertson, D. F., Grad. S.P.S.	2	A	" "	1,650 00
Sutherland, H. E., B. Sc.	2	B	Draughtsman.	1,350 00
Kitto, F. H., D.L.S.	2	B	" ..	1,450 00
McClennan, W. D.	2	B	" ..	1,600 00
Roger, A., O.L.S.	2	B	" ..	1,600 00
Spreckley, R. O.	2	B	" ..	1,450 00
Goodday, Leonard.	2	B	" ..	1,350 00
Bray, R. P.	2	B	" ..	1,350 00
Harrison, E. W.	2	B	" ..	1,250 00
Ault, H. W.	2	B	" ..	1,250 00
Lytle, W. J.	2	B	" ..	1,000 00
La Beree, E. E.	2	B	" ..	1,000 00
Jones, G. S., Grad. S.P.S., O.L.S.	2	B	" ..	1,000 00
Bradley, J. D.	2	B	" ..	1,000 00
Dubuc, C. P., Q.L.S.	2	B	" ..	1,000 00
Cagnat, G. H.	2	B	" ..	1,000 00
Fournier, O. E., B.A.S.	2	B	" ..	1,000 00
Ross, C. M., B. Sc.	2	B	" ..	1,200 00
Macdonald, J. A.	3	B	Clerk ..	800 00

APPENDIX No. 9.—Continued.

Chief Draughtsman's Office, Third Section—(Imperial Building, Queen street).
Copying plans for reproduction.

Name.	CLASSIFICATION.		Duties of Office.	Salary.
	Division	Sub-division.		
				\$ cts.
Engler, Carl, B.A., D.L.S.	2	A	Chief of section	2,000 00
May, J. E.	2	A	Asst. "	1,850 00
O'Connell, J. R.	2	A	" "	1,650 00
Moule, W. J.	2	B	Draughtsman	1,600 00
Helmer, J. D.	2	B	Clerk	1,050 00
Archambault, E.	2	B	"	1,050 00
Dawson, R. J.	2	B	"	1,050 00
Watters, James.	3	A	Printer	1,200 00
Tremblay, A.	3	A	Clerk	900 00
Brown, A.	3	A	"	900 00
Ebbs, E. J.	3	A	"	900 00
Beaubien, A. H.	3	B	"	700 00
Baril, C.	3	B	"	700 00
Marchand, C. E.	3	B	Engrosser	500 00

Chief Draughtsman's Office, Fourth Section—(Metcalf street, corner of Slater).
British Columbia surveys.

Rowan-Legg, E. L.	2	A	Chief of section	2,000 00
Gillmore, E. T. B., Grad. R.M.C.	2	A	Asst. chief "	1,950 00
Lawe, H. D.L.S.	2	A	" "	1,850 00
MacIlquham, W. L., B. Sc.	2	A	" "	1,850 00
Morley, R. W.	2	A	" "	1,850 00
Weld, W. E.	2	A	" "	1,850 00
Wilson, E. E.D.	2	A	" "	1,600 00
Osmond, H. A.K.C.	2	B	Draughtsman	1,250 00
Harris, K. D	2	B	"	1,250 00

Chief Draughtsman's Office, Fifth Section—(Imperial Building, Queen street).
Mapping.

Smith, J.	1	B	Chief of section.	2,450 00
Begin, P. A.	2	A	Asst. chief "	1,900 00
Flindt, A. H.	2	A	" "	1,650 00
Blanchet, A. E.	2	B	Draughtsman	1,600 00
Davies, T. E.S.	2	B	"	1,550 00
Perrin, V.	2	B	"	1,550 00
d'Orsonnens, A.	2	B	"	1,550 00
Davy, E.	2	B	"	1,350 00
Villeneuve, E.	2	B	"	1,050 00
Bergin, W.	2	B	"	1,050 00
Howie, Jas.	2	B	"	1,000 00
Purdy, W. A.	2	B	"	1,100 00
Brigly, J. H.	2	B	"	1,300 00

SESSIONAL PAPER No. 25b

APPENDIX No. 9.—Concluded.

Chief Draughtsman's Office, Sixth Section—(Imperial Building, Queen street).
Scientific and topographical work.

Name.	Classification.		Duties of Office.	Salaries.
	Division	Sub-division		
				\$ cts.
Dodge, G. B., D.L.S.	1	B	Chief of section....	2,450 00
Coté, J. A., Grad. R.M.C..	2	A	Asst. chief of section .	1,600 00
Blanchard, J. F.....	2	B	Draughtsman.....	1,000 00
Chartrand, D. E., B.Sc.....	2	B	"	1,050 00
Cousineau, A., B.A.Sc	2	B	"	1,050 00
Dozois, L. O. R., Grad. R.M.C.....	2	B	"	1,050 00
Fredette, J. F	2	B	"	1,000 00
Hoar, C. M., B.Sc., D.L.S.....	2	B	"	1,000 00
Roe, B. J.....	2	B	"	1,000 00
Lynch, F. J.....	3	B	Typewriter.	800 00
Watson, J. A.....	3	B	Clerk.....	700 00

Geographic Board (Woods Building, Slater street).

Whitcher, A. H., F.R.G.S., D.L.S.	2	A	Secretary.....	2,100 00
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Photographic Office (Metcalfé street, corner Slater street).

Carruthers, H. K.	2	A	Process photographer ...	1,850 00
Woodruff, John.	2	A	Chief " ..	1,850 00
Whitcomb, H. E.	3	A	Photographer	1,200 00
Morgan, W. E.	3	A	" ..	1,150 00
Kilmartin, A.	3	A	Asst. photographer...	900 00
Devlin, A.	3	B	" ..	800 00
Quimet, E. G.	3	B	" ..	800 00

Lithographic Office (unclassified) (Metcalfé street, corner Slater street).

Name.	Occupation.	Salaries.
		\$
Moody, A.	Foreman	25 00 per week.
Burnett, E.	Lithographer	25 00
Thicke, C. R.	"	22 00
Deslauriers, J. H.	Transferrer.	20 00
Bergin, J.	Printer	20 00
Thicke, H. S.	"	18 00
Boyle, S.	Stone polisher	14 00
Gagnon, J.	Press feeder	11 00
Kane, P.	"	8 00
Easton, H. M.	Printer	18 50
Hare, E. H.	Asst. photographer	14 00

2 GEORGE V., A. 1912

APPENDIX No. 10.

List of Dominion Land Surveyors who have been supplied with Standard Measures.

Name.	Address.	Date of Birth.	Date of Appointment or of Commission.	Remarks.
Akins, James Robert.....	Kinburn, Ont.	Sept. 2, '76	Mar. 14, '10	
Allison, Calvin Bruce	South Woodslee, Ont.	June 16, '84	Mar. 28, '10	
Ashton, Arthur Ward.....	Ottawa, Ont.	Nov. 5, '80	May 29, '08	
Austin, George Frederick	Not known.		April 14, '72	
Aylen, John.....	North Bay, Ont.		May 29, '85	
Aylsworth, Charles Fraser.	Madoc, Ont.	April 21, '62	May 13, '86	O. L. S.
Baker, James Clarence.....	Vermilion, Alta.	May 12, '78	May 18, '06	
Baker, Mason Hermon.....	St. Thomas, Ont.	July 9, '84	Aug. 6, '08	O. L. S.
Bayne, George A.....	Winnipeg, Man.	Oct. 25, '50	April 14, '72	M. L. S.
Beatty, David.....	Parry Sound, Ont.	Dec. 22, '42	April 14, '72	O. L. S.
Begg, William Arthur.	Hamilton, Ont.	July 15, '82	June 8, '09	
Belanger, Phidime Roch Arthur	Ottawa, Ont.	Mar. 5, '53	May 17, '80	Inspector of Surveys, Topographical Surveys Branch, Dept. of the Interior.
Belleau, Joseph Alphonse.	Ottawa, Ont.	Sept. 30, '56	May 15, '83	Topographical Surveys Branch, Dept. of the Interior.
Bemister, George Bartlett.	Winnipeg, Man.		June 11, '78	M. L. S. Engineering Dept. C.N.R.
Bennett, George Arthur.	Eden, Ont.	May 18, '86	Aug. 25, '10	
Bigger, Charles Albert	Ottawa, Ont.	Aug. 15, '53	Mar. 30, '82	B. C. L. S., O. L. S., As- sistant Superintendent Geodetic Survey.
Bingham, Edwin Ralph.....	Fort William, Ont.	—	'78 Oct. 25, '06	O. L. S.
Blanchet, Guy Houghton.....	Ottawa, Ont.	Feb. 12, '84	Mar. 10, '10	
Boswell, Elias John.	Not known.....		Mar. 18, '03	O. L. S., M. L. S.
Bourgeault, Armand.....	St. Jean Port Joli, Que.	Feb. 23, '58	Mar. 29, '83	Q. L. S.
Bourgault, Charles Eugene.....	St. Jean Port Joli, Q.	Sept. 6, '61	Feb. 21, '88	
Bourget, Charles Arthur.....	Lauzon, Que.	Aug. 26, '51	May 14, '84	Q. L. S.
Bowman, Herbert Joseph ..	Berlin, Ont.	June 18, '65	Feb. 16, '88	O. L. S.
Brabazon, Alfred James.....	Ottawa, Ont.		May 13, '82	Boundary Survey, Dept. of the Interior.
Brady, James.....	Golden, B.C.	Nov. 24, '46	April 14, '72	O. L. S., B. C. L. S.
Bray, Samuel.....	Ottawa, Ont.	Nov. 5, '46	Nov. 14, '83	O. L. S., Chief Surveyor, Dept. of Indian Affairs.
Blay, Lennox Thomson.....	Amherstburg, Ont.	Mar. 14, '77	Feb. 18, '03	O. L. S.
Brenot, Lucien... ..	Ottawa, Ont.	Aug. 31, '87	Mar. 18, '10	
Bridgland, Morrison Parsons...	Calgary, Alta.	Dec. 20, '78	Mar. 10, '05	
Broughton, George Henry.....	Penticton, B.C.	Aug. 12, '86	June 3, '09	B. C. L. S.
Brown Charles Dudley.....	Winnipeg, Man.	Feb. 25, '83	April 4, '10	
Brown, Thomas Wood.....	Edmonton, Alta.		June 21, '09	
Brownlee, James Harrison.	Vancouver, B.C.	Mar. 22, '56	April 15, '87	M. L. S., B. C. L. S.
Bucknill, Walter Birch	Vancouver, B. C.	May 8, '73	Mar. 19, '08	B. C. L. S.
Burgess, Edward LeRoy	Ottawa, Ont.	May 5, '78	Feb. 23, '05	O. L. S., T. S. Branch, Dept. of Interior.
Burnet, Hugh.....	Victoria, B.C.		June 22, '85	O. L. S., B. C. L. S.
Burwash, Nathaniel Alfred	Whitehorse, Y.T.	Sept. 28, '79	Mar. 6, '07	O. L. S.
Burwell, Herbert Mahlon	Vancouver, B.C.	Oct. 23, '63	Feb. 17, '87	B. C. L. S.
Campbell, Alan John.....	Sidney, B.C.	Oct. 1, '82	April 13, '09	
Campbell, Alexander Stewart..	Kingston, Ont.	Mar. 7, '80	Mar. 6, '09	
Carbert, Joseph Alfred.	Medecine Hat, Alta.	Feb. 4, '56	May 12, '80	O. L. S., District Engineer and Surveyor, Dept. of Public Works, Alberta.
Carpenter, Henry Stanley.....	Regina, Sask.	Feb. 8, '74	Feb. 20, '01	Dept. of Public Works, O. L. S.
Carroll, Cyrus.	Prince Albert, Sask.	Dec. 6, '34	April 14, '72	O. L. S.
Carson, Percy Alexander	Ottawa, Ont.	Dec. 25, '77	Feb. 22, '06	
Carthew, William Morden... ..	Edmonton, Alta.	Oct. 19, '86	Mar. 29, '10	

SESSIONAL PAPER No. 25b

APPENDIX No. 10—Continued.

List of Dominion Land Surveyors who have been supplied with Standard Measures—Continued.

Name.	Address.	Date of Birth.	Date of Appointment or of Commission.	Remarks.
Cautley, Reginald Hutton.....	Edmonton, Alta.....	Dec. 6, '79	May 1, '05	
Cautley, Richard William.....	Edmonton, Alta.....	Aug. 3, '73	Sept. 2, '96	
Cavana, Allan George.....	Orillia, Ont.....	Jan. 22, '58	Nov. 16, '76	O L.S.
Charlesworth, Lionel Clare....	Edmonton, Alta.....	Nov. 17, '73	Mar. 24, '03	O L.S., Dept. of Public Works for Alberta.
Chilver, Charles Alonzo.....	Walkerville, Ont.....	Feb. 8, '83	Feb. 22, '07	
Christie, William.....	Prince Albert, Sask.	Feb. 13, '76	Mar. 22, '06	
Clarke, Charles Wentworth....	Regina, Sask.....	Nov. 19, '75	Mar. 24, '10	
Cleveland, Ernest Albert.....	Vancouver, B.C.....	May 12, '74	June 27, '99	B.C.L.S.
Coates, Preston Charles.....	Golden, B.C.....	May 16, '81	Apr. 19, '07	B.C.L.S.
Cokely, Leroy S.....	Merritt, B.C.....	Nov. 23, '84	Mar. 22, '10	
Côté, Joseph Adélar.....	Prince Albert, Sask.	June 5, '64	May 14, '84	
Côté, Jean Léon.....	Edmonton, Alta.....	May 6, '67	Mar. 21, '90	
Cotton, Arthur Frederick.....	New Westminster, B.C.....	Aug. 8, '52	May 11, '80	O.L.S., B.C.L.S.
Craig, John Davidson.....	Ottawa, Ont.....	Jan. 30, '76	Feb. 24, '02	Boundary Surveys, Dept. of the Interior.
Cumming, Austin Lewis....	Cornwall, Ont.....	Aug. 25, '82	Feb. 3, '10	
Cummings, Alfred.....	Fernie, B.C.....	July 3, '80	Mar. 3, '09	B.C.L.S.
Cummings, John George.....	Cranbrook, B.C.....	Nov. 19, '73	Feb. 17, '04	B.C.L.S.
Dalton, John Joseph.....	Weston, Ont.....	June 12, '54	Apr. 17, '79	O.L.S., D.T.S.
Davies, Thomas Attwood....	Edmonton, Alta.....		Feb. 22, '06	
Dawson, Frederick James.....	Ashcroft, B.C.....	Sept. 22, '86	Sept. 12, '10	
Day, Harry Samuel.....	St. John, N.B.....	Nov. 14, '85	Mar. 9, '10	
Deans, William James.....	Brandon, Man.....	May 4, '60	May 13, '86	O.L.S.
de la Condamine, C.....	High River, Alta.....	Feb. 13, '75	May 4, '10	
Dennis, John Stoughton.....	Calgary, Alta.....	Oct. 22, '56	Nov. 19, '77	D.T.S.
Denny, Herbert C.....	Not known.....		Apr. 1, '82	
Dickson, Henry Godkin.....	Whitehorse, Y.T.....	Mar. 29, '64	Mar. 19, '89	M.L.S.
Dickson, James.....	Fenelon Falls, Ont.....	Oct. 30, '34	Apr. 14, '72	O.L.S.
Dobie, James Samuel.....	Thessalon, Ont.....	Oct. 15, '73	Mar. 22, '06	O.L.S.
Doupe, Jacob Lonsdale.....	Winnipeg, Man.....	Sept. 14, '67	Oct. 6, '88	M.L.S., Asst. Land Commissioner for C.P.R.
Drewry, William Stewart.....	Nelson, B.C.....	Jan. 20, '59	Nov. 14, '83	O.L.S., B.C.L.S.
Driscoll, Alfred.....	Edmonton, Alta.....	July 2, '65	Feb. 23, '87	B.C.L.S.
Drummond, Thomas.....	Montreal, P.Q.....	1856	June 24, '78	D.T.S.
Ducker, William A.....	Winnipeg, Man.....	Apr. 4, '52	Mar. 30, '83	O.L.S., M.L.S.
Durnais, Paul T. Concorde.....	Hull, P.Q.....	Jan. 2, '47	Mar. 29, '82	Q.L.S.
Edwards, George.....	Ponoka, Alta.....	June 13, '42	Apr. 14, '72	O.L.S.
Edwards, William Milton.....	Lethbridge, Alta.....	June 21, '79	Apr. 5, '10	
Ellacott, Charles Herbert.....	Victoria, B.C.....	Dec. 24, '66	Feb. 22, '99	B.C.L.S.
Empey, John Morgan.....	Calgary, Alta.....	Apr. 16, '74	Feb. 23, '05	O.L.S.
Engler, Carl.....	Ottawa, Ont.....	Sept. 30, '72	Feb. 23, '05	T.S., Branch Dept. of Interior.
Fairchild, Charles Courtland..	Brantford, Ont.....	Feb. 21, '67	Feb. 20, '01	O.L.S.
Farncomb, Alfred Ernest.....	Lacombe, Alta.....	May 22, '73	Mar. 12, '02	O.L.S.
Fawcett, Thomas.....	Toronto, Ont., ..	Oct. 28, '48	Nov. 18, '76	O.L.S., D.T.S.
Fawcett, Adam.....	Gravenhurst, Ont.....		Feb. 22, '98	
Ferguson, George Hendry.....	Toronto, Ont.....	Jan. 20, '83	June 2, '09	
Findlay, Allan.....	Winnipeg, Man.....	Oct. 15, '80	Mar. 21, '08	
Fontaine, Louis Elie.....	Levis, P.Q.....	Oct. 3, '68	Nov. 30, '92	
Francis, John.....	Portage la Prairie, M	Dec. 22, '52	June 17, '75	M.L.S.
Garden, James Ford.....	Vancouver, B.C....	Feb. 19, '47	May 13, '80	B.C.L.S.
Garden, George H.....	Lethbridge, Alta.....		Apr. 14, '72	Deputy Surveyor for N.B.
Garden, Charles.....	Not known.....		Apr. 14, '72	Deputy Surveyor for N.B.
Garner, Albert Coleman....	S. Qu'Appelle, Sask.	Sept. 6, '78	May 27, '07	
Gauvreau, Louis Pierre.....	Not known.....		Apr. 14, '72	
Gibbon, James.....	Dawson, Y.T.....	June 25, '60	Feb. 12, '91	O.L.S.
Gordon, Maitland Lockhart....	Vancouver, B.C....		Feb. 18, '04	B.C.L.S.
Gordon, Robert John.....	Lethbridge, Alta.....	June 18, '69	Mar. 12, '02	
Gore, Thomas Sinclair.....	Victoria, B.C.....	1852	Apr. 19, '79	B.C.L.S.
Graham, John Robertson.....	Ottawa, Ont.....	April 18, '87	May 26, '10	
Green, Alfred Harold.....	Nelson, B.C.....	Jan. 20, '79	Feb. 23, '05	B.C.L.S.

2 GEORGE V., A. 1912

APPENDIX No. 10—Continued.

List of Dominion Land Surveyors who have been supplied with Standard Measures—Continued.

Name.	Address.	Date of Birth.	Date of Appointment or of Commission.	Remarks.
Green, Thomas Daniel	Prescott, Ont.....	Dec. 21, '57	May 19, '84	O.L.S.
Green, Frank Compton	Nelson, B.C.....	.....	May 8, '03	B.C.L.S.
Grover, George Alexander	Norwood, Ont.....	.....	Feb. 18, '04	
Hamilton, James Frederick	Lethbridge, Alta...	Apr. 4, '69	June 2, '09	
Harris, John Walter	Winnipeg, Man..	Feb. 26, '45	Apr. 14, '72	O.L.S., M.L.S., City Surveyor.
Harrison, Edward..	Belleville, Ont.	.....	May 14, '10	
Harvey, Charles	Kelowna, B.C.....	May 5, '76	Feb. 17, '04	B.C.L.S.
Hawkins, Albert Howard	Listowel, Ont.....	July 27, '62	Mar. 6, '06	
Heaman, John Andrew	Winnipeg, Man....	June 3, '75	July 15, '09	O.L.S.
Heathcott, Robert Vernon	Edmonton, Alta....	July 7, '81	May 13, '07	
Henderson, Walter	Not known.....	.....	Nov. 17, '83	
Heuperman, Lambertus Fred.	Calgary, Alta.....	Sept. 20, '81	Mar. 29, '10	
Holcroft, Herbert Spencer	Toronto, Ont.....	Sept. 4, '77	Feb. 18, '03	O.L.S.
Hopkins, Marshall Willard	Edmonton, Alta....	May 24, '61	Feb. 20, '01	O.L.S.
Hubbell, Ernest Wilson	Ottawa, Ont.....	Nov. 5, '62	May 19, '84	Inspector of Surveys, Topographical Surveys Branch, Dept. of Interior.
James, Silas	Toronto, Ont.....	June 19, '34	Apr. 14, '72	O.L.S.
Jephson, Richard Jermy	Brandon, Man.....	Feb. 5, '54	May 12, '80	O.L.S., B.C.L.S.
Johnson, Alfred William	Kamloops, B.C.....	Feb. 23, '74	Mar. 12, '02	B.C.L.S.
Keith, Homer Pasha	Edmonton, Alta....	Aug. 30, '85	Feb. 1, '11	
Kimpe, Maurice	Edmonton, Alta....	Jan. 17, '76	May 13, '07	
King, William Frederick	Dominion Observatory, Ottawa, Ont.	Feb. 19, '54	Nov. 21, '76	D.T.S., Chief Astronomer Dept. of Interior.
Kirk, John Albert	Summerland, B.C....	Jan. 9, '54	May 11, '80	O.L.S., B.C.L.S.
Kitto, Franklin Hugo	Ottawa, Ont.....	Mar. 28, '80	Mar. 6, '08	Topographical Surveys Br., Dept. of Interior.
Klotz, Otto Julius	Dominion Observatory, Ottawa, Ont.	Mar. 31, '52	Nov. 19, '77	O.L.S., D.T.S., Astronomer, Dept., of Interior.
Knight, Richard H	Edmonton, Alta....	June 7, '77	Feb. 18, '04	
Lang, John Leiper	Toronto, Ont.....	.....	Oct. 14, '08	
Latimer, Frank Herbert	Penticton, B. C.....	May 23, '60	Nov. 13, '85	
Laurie, Richard C.	Battleford, Sask....	Jan. 31, '58	April 27, '83	
Lawe, Henry	Ottawa, Ont.....	Feb. 28, '38	April 14, '72	O.L.S., M.L.S. Topographical Surveys Branch, Dept. of Interior.
Lemoine, Charles Errol	Ville Montcalme, P.Q.	.....	Mar. 31, '82	Q.L.S.
Lendrum, Robert Watt	Strathcona, Alta....	July 24, '34	May 15, '80	O.L.S.
Lighthall, Abram	Vankleek Hill, Ont.	Mar. 30, '78	Dec. 25, '09	
Lonergan Gerald Joseph	Buckingham, P.Q....	Oct. 8, '71	Feb. 28, '01	Q.L.S. Inspector of Surveys, Dept. of Interior.
Lumsden, Hugh David	Ottawa, Ont.....	Sept. 7, '44	April 14, '72	O.L.S.
MacLennan, Alexander L.	Toronto, Ont.....	May 10, '78	Feb. 23, '05	
MacPherson, Charles Wilfrid	Dawson, Y.T.....	Sept. 6, '71	Mar. 7, '00	O.L.S. Director of Surveys, Y.T.
Magrath, Charles Alexander	Lethbridge, Alta....	April 22, '60	Nov. 16, '81	B.A.Sc., O.L.S., B.C.L.S., D.T.S.
Martyn, Oscar William	Mitchell, Ont.....	Dec. 2, '88	Mar. 11, '11	
Meadows, William Walter	Maple Creek, Sask..	May 27, '73	Feb. 23, '05	O.L.S.
Miles, Charles Falconer	Toronto, Ont.....	Jan. 30, '38	Apr. 14, '72	O.L.S. Inspector of Surveys, Dept. of Interior.
Mitchell, Benjamin Foster	Calgary, Alta....	June 16, '80	April 16, '08	
Moberly, Harford Kenneth	Moosomin, Sask..	.....	'69 April 21, '03	
Molloy, John	Winnipeg, Man..	Jan. 13, '40	April 14, '72	M.L.S.
Montgomery, Royal Harp	Prince Albert, Sask.	May 29, '82	Feb. 23, '05	O.L.S.
Moore, Herbert Harrison	Calgary, Alta....	Dec. 1, '69	Feb. 17, '04	
Morrier, Joseph Eldedge	Ottawa, Ont.....	Aug. 29, '74	May 16, '07	
McArthur, James Joseph	Ottawa, Ont.....	May 9, '56	April 17, '79	Boundary Survey, Dept. of Interior.
McCaw, Robert Daniel	Sidney, B.C.....	May 24, '83	Mar. 23, '09	

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APPENDIX No. 10—Continued.

LIST of Dominion Land Surveyors who have been supplied with Standard Measures—Continued.

Name.	Address.	Date of Birth.	Date of Appointment or of Commission.	Remarks.
McColl, Gilbert Beebe.	Winnipeg, Man.	Oct. 8, '82	Mar. 20, '07	M.L.S., D.T.S.
McDiarmid, Stuart Stanley....	Vancouver, B.C.	Aug. 4, '81	Feb. 23, '05	B.C.L.S.
McFadden, Moses.	Vancouver, B.C.	Aug. 26, '26	April 14, '72	O.L.S., M.L.S.
McFarlane, Walter Graham ...	Toronto, Ont.	Sept. 28, '75	May 19, '05	
McFarlane, John Baird.	Claremont, Ont.	Feb. 25, '79	June 3, '08	
McFee, Angus.	Red Deer, Alta.	July 14, '46	April 19, '79	
McGeorge, William Graham....	Chatham, Ont.	Mar. 22, '87	Mar. 21, '10	
McGrandle, Hugh.	Wetaskiwin, Alta.	Mar. 12, '57	Mar. 30, '83	O.L.S.
McKenna, John Joseph.	Dublin, Ont.		April 14, '72	O.L.S.
McKenzie, John.	New Westminster, B.C.	Oct. 31, '47	Nov. 18, '87	
McLean, James Keachie.	Ottawa, Ont.	Dec. 19, '51	April 1, '82	O.L.S. Dept. of Indian Affairs.
McMillan, George.	Finch, Ont.	Dec. 9, '69	Feb. 22, '06	
McNaughton, Alexander L.	Cornwall, Ont.	Sept. 30, '81	Feb. 23, '05	O.L.S., B.C.L.S.
McPherson, Archibald John....	Regina, Sask.		'70 Feb. 21, '01	
McPhillips, George.	Winnipeg, Man.	April 26, '48	June 17, '75	O.L.S., M.L.S.
McPhillips, Robert Charles....	Winnipeg, Man.	April 24, '56	May 17, '80	
McVittie, Archibald W.	Victoria, B.C.	May 5, '58	Mar. 30, '82	B.C.L.S.
Nash, Thomas Sanford.	Ottawa, Ont.	July 2, '75	Feb. 18, '04	Topographical Surveys Branch, Dept. of Interior
Ogilvie, William.	Ottawa, Ont.	April 7, '46	April 14, '72	O.L.S.
O'Hara, Walter Francis.	Ottawa, Ont.		Feb. 19, '95	O.L.S.
Ord, Lewis Redman.	Hamilton, Ont.	Oct. 17, '36	April 1, '82	O.L.S.
Parsons, Johnstone Lindsay R..	Regina, Sask.	Jan. 18, '76	Feb. 23, '05	O.L.S.
Patrick, Allan Poyntz.	Calgary, Alta.	July 18, '49	Nov. 19, '77	B.C.L.S., D.T.S.
Patten, Thaddeus James.	Little Current, Ont.	Feb. 4, '59	Mar. 29, '83	O.L.S.
Pearce, William.	Calgary, Alta.	Feb. 1, '48	May 10, '80	O.L.S., B.C.L.S.
Pequegnat, Marcel.	Berlin, Ont.	April 27, '86	June 6, '10	
Peters, Frederic Hatheway.	Calgary, Alta.	Nov. 4, '83	Mar. 4, '10	Commissioner of Irrigation
Phillips, Edward Horace.	Saskatoon, Sask.	Dec. 19, '78	Feb. 24, '02	
Phillips, Harold Geoffrey.	Saskatoon, Sask.	Sept. 3, '87	April 23, '10	
Pierce, John Wesley.	Haileybury, Ont.		Dec. 24, '09	
Plunkett, Thomas Hartley.	Meaford, Ont.	June 1, '78	Mar. 12, '08	
Ponton, Archibald William.	Edmonton, Alta.	Jan. 25, '59	May 18, '81	O.L.S.
Proudfoot, Hume Blake.	Saskatoon, Sask.	June 23, '58	Mar. 28, '82	O.L.S.
Rainboth, Edward Joseph.	Ottawa, Ont.		May 19, '81	Q.L.S., O.L.S.
Ransom, John Thomas.	Toronto, Ont.	Aug. 24, '88	Jan. 14, '11	
Reid John Lestock.	Prince Albert, Sask.	Sept. 12, '41	April 14, '72	Dept. of Indian Affairs.
Reilly, William Robinson.	Regina, Sask.	Aug. 10, '57	Nov. 17, '81	O.L.S., M.L.S.
Richard, Joseph Francois.	Ste. Anne de la Pocatière, P.Q.		May 13, '82	
Rinfret, Raoul.	Montreal, P.Q.	July 16, '56	Feb. 20, '00	Q.L.S.
Ritchie, Joseph Frederick.	Prince Rupert, B.C.	May 23, '63	Jan. 7, '89	B.C.L.S.
Robertson, Henry H.	N. Temiskaming, P.Q.	Sept. 13, '47	Apr. 14, '72	Q.L.S.
Roberts, Sydney Archibald.	Victoria, B.C.	April 10, '48	May 16, '87	B.C.L.S.
Roberts, Vaughan Maurice.	Goderich, Ont.	Mar. 22, '64	May 17, '86	
Robinson, Ernest Walter P.	Ottawa, Ont.	May 8, '80	May 1, '08	
Robinson, Franklin Joseph.	Regina, Sask.	Oct. 20, '70	Feb. 20, '00	Deputy Minister of Public Works.
Rolfson, Orville.	Walkerville, Ont.	Feb. 26, '85	July 11, '08	
Rombough, Marshall Bedwell.	Morden, Man.	Oct. 14, '35	April 14, '72	M.L.S.
Rorke, Louis Valentine.	Toronto, Ont.	Feb. — '65	Aug. 13, '91	O.L.S. Inspector of Surveys for Ontario.
Ross, George.	Welland, Ont.	June 12, '53	Nov. 21, '82	O.L.S.
Ross, Joseph Edmund.	Kamloops, B.C.	Jan. 9, '61	Feb. 12, '91	O.L.S., B.C.L.S.
Routly, Herbert Thomas.	Haileybury, Ont.	Jan. 20, '78	Feb. 15, '11	
Roy, George Peter.	Quebec, P.Q.	Oct. 1, '52	Nov. 17, '81	Q.L.S.
Roy, Joseph George Emile.	Quebec, P.Q.	Mar. 14, '86	May 25, '10	
Saint Cyr, Jean Baptiste.	Montreal, P.Q.	Dec. 17, '66	Feb. 17, '87	Q.L.S.
Saint Cyr, Arthur.	Ottawa, Ont.	Nov. — '60	Feb. 17, '87	

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APPENDIX No. 10—*Concluded.*

List of Dominion Land Surveyors who have been supplied with Standard Measures—*Concluded.*

Name.	Address.	Date of Birth.	Date of Appointment or of Commission.	Remarks.
Saunders, Bryce Johnston.....	Edmonton, Alta....	Oct. 17, '60	Nov. 16, '84	O.L.S.
Scott, Walter Alexander.....	Galt, Ont.....	Aug. 8, '85	Mar. 9, '09	
Seager, Edmund.....	Kenora, Ont.....	Nov. 22, '38	April 14, '72	O.L.S.
Sewell, Henry DeQuincy.....	Toronto, Ont.....	April 18, '48	May 16, '85	O.L.S.
Seymour, Horace Llewellyn....	Edmonton, Alta....	June 11, '82	Feb. 22, '06	O.L.S.
Shaw, Charles Aeneas.....	Greenwood, B.C....	Nov. 16, '53	May 10, '80	O.L.S., B.C.L.S.
Sheply, Joseph Drummond.....	N. Battleford, Sask..	Sept. 13, '79	Mar. 12, '06	
Smith, Charles Campbell.....	Ottawa, Ont.....	Jan. 1, '73	Feb. 22, '06	O.L.S.
Smith, Donald Alpine.....	Claude, Ont.....	Sept. 22, '80	April 21, '10	
Smith, James Herbert.....	Edmonton, Alta....	Nov. 9, '76	Feb. 23, '05	
Speight, Thomas Bailey.....	Toronto, Ont.....	Feb. 8, '59	Nov. 16, '82	O.L.S.
Starkey, Samuel M.....	Codys, N.B.....	Sept. 4, '37	April 14, '72	
Steele, Ira John.....	Ottawa, Ont.....	April 6, '81	April 16, '08	
Stewart, Elihu.....	Collingwood, Ont.,..	Nov. 17, '44	April 14, '72	O.L.S.
Stewart, Lionel Douglas N....	Collingwood, Ont.....		Jan. 27, '10	
Stewart, Will Malcolm.....	Saskatoon, Sask.....	Nov. 26, '84	June 6, '07	
Stewart, Louis Beaufort.....	Toronto, Ont....	Jan. 27, '61	Nov. 22, '82	O.L.S., D.T.S.
Stewart, George Alexander....			April 14, '72	O.L.S.
Stock, James Joseph.....	Ottawa, Ont.....	Aug. 16, '87	Mar. 2, '10	
Street, Paul Bishop.....	Toronto, Ont.....	Dec. 3, '81	Mar. 29, '10	
Summers, Gordon Foster.....	Haileybury, Ont.....		Oct. 20, '10	
Talbot, Albert Charles.....	Calgary, Alta.....	April 5, '56	May 13, '80	
Taylor, Alexander.....	Portage la Prairie, Man.	Aug. 6, '75	June 9, '04	M.L.S.
Taylor, William Emerson.....	Owen Sound, Ont....	Aug. 3, '81	Dec. 16, '10	
Teasdale, Charles Montgomery..	Concord, Ont.....	Oct. 18, '79	Mar. 9, '06	
Thompson, William Thomas....	Grenfell, Sask....	Nov. 1, '53	Nov. 19, '77	D.T.S.
Tracy, Thomas Henry.....	Vancouver, B.C....	June 25, '48	April 14, '72	O.L.S., B.C.L.S.
Tremblay, Alfred Joseph....	Les Eboulements, P.Q.		Feb. 18, '90	
Turnbull, Thomas.....	Winnipeg, Man....	May 26, '57	Mar. 29, '82	O.L.S.
Tyrrell, James William.....	Hamilton, Ont.....	May 10, '63	Feb. 16, '87	O.L.S.
Vaughan, Josephus Wyatt.....	Vancouver, B.C....	Oct. 17, '45	June 11, '78	B.C.L.S.
Vicars, John Richard Odium....	Kamloops, B.C....	April 16, '55	May 17, '86	O.L.S., B.C.L.S.
Waddell, William Henry.....	Edmonton, Alta....	Mar. 23, '83	Mar. 25, '07	O.L.S.
Waldron, John.....	Pine Grove, Ont....	Aug. 1, '72	April, 2, '07	
Walker, Claude Melville.....	Guelph, Ont.....	Oct. 16, '84	Mar. 11, '11	
Walker, Ernest Ward.....	Regina, Sask....	Dec. 26, '75	Mar. 27, '07	
Wallace, James Nevin.....	Calgary, Alta.....	Aug. 21, '70	Feb. 20, '00	O.L.S.
Warren, James.....	Walkerton, Ont.....	Nov. 7, '37	April 14, '72	
Watt, George Herbert.....	Ottawa, Ont.....	Feb. 5, '76	Feb. 24, '02	
Weekes, Abel Seneca.....	Edmonton, Alta....	Feb. 17, '66	Feb. 11, '92	
Weekes, Melville Bell.....	Regina, Sask.....	Nov. 28, '74	Feb. 18, '03	O.L.S.
Wheeler, Arthur Oliver.....	Calgary, Alta....	May 1, '60	Nov. 21, '82	O.L.S., B.C.L.S.
White-Fraser, George W. R. M.	Ottawa, Ont.....		Feb. 21, '88	D.T.S.
Wiggins, Thomas Henry.....	Saskatoon, Sask....	Aug. 24, '63	Feb. 18, '96	O.L.S.
Wilkins, Frederick W. B.....	Norwood, Ont.....	June 27, '54	May 18, '81	O.L.S., D.T.S.
Wilkinson, William Downing..	Not known.....		Feb. 22, '93	
Williams, Guy Lorne.....	Enderby, B.C.....	Mar. 3, '79	June 24, '08	B.C.L.S.
Woods, Joseph Edward.....	Pincher Creek, Alta.	Oct. 13, '61	Nov. 14, '85	
Young, Walter Beatty.....	Winnipeg, Man....	July 6, '80	Mar. 25, '05	M.L.S.
Young, William Howard.....	Lethbridge, Alta....	June 8, '78	May 17, '07	

GENERAL REPORTS OF SURVEYORS

1910-1911

APPENDIX No. 11.

ABSTRACT OF THE REPORT OF J. R. AKINS, D.L.S.

BASE LINE AND MISCELLANEOUS SURVEYS IN SOUTHWESTERN ALBERTA.

After four days spent in having the horses shod, getting the outfit together, engaging men and testing instruments we left Morley for the field on May 13, 1910 and reached the northeast corner of township 20 range 7 west of the fifth meridian on the 17th.

My instructions were to extend the sixth base line across ranges 7, 8 and 9 from the Elbow to Kananaskis river, so that a meridian line might be run north through the valley of the Kananaskis, to locate, and tie to the Dominion Lands system of survey, some coal claims in townships 21, 22 and 23, range 9.

Between these two rivers the country is very mountainous, being a sea of high peaks and ridges, some of an elevation of ten thousand feet. To produce the line over these by ordinary surveying operations was out of the question. Our method was to produce the line in proper azimuth and to obtain the distance by a system of triangulation.

We laid out a base line in the valley of Elbow river of one hundred and forty-seven chains, and one hundred and nineteen chains of this we used as a second base, thus having a common side for the two triangles. Corrections to the measurements were made for sag, temperature and difference of elevation of stations. In the triangulation, all the angles were read to seconds by repetition. The work was carried on as far as practicable from the camp on the Elbow and our next camp was pitched on Fisher creek at its intersection by the base line. From this point we worked westerly making flying camps to about timber-line on the sides of the mountains.

During the month of May clouds interfered considerably with the work; in many cases several trips up a mountain had to be made before the angles could be read. In June our troubles were increased by smoke from fires to the east and south of us.

About the end of June we reached Kananaskis river and from there we carried on operations by man-packing over the ridge. After getting the line and triangulation to the Kananaskis valley we checked our work by measuring a side of a triangle whose length had been obtained already by calculation. The distances checked to about a link.

We finished operations in the Kananaskis valley about the end of October, with the snow one foot and a half deep on the tops of the mountains.

We returned to Morley and on October 31 started for township 24, range 6, where we worked till December 7 when we returned to Morley and disbanded.

APPENDIX No. 12.

ABSTRACT OF THE REPORT OF C. F. AYLSWORTH, D.L.S.

RESURVEYS IN SOUTHEASTERN SASKATCHEWAN AND MANITOBA.

Having organized my party at Winnipeg we left on May 6 for Kamsack and began work in township 31, range 31, west of the principal meridian on May 12. We resurveyed part of this township and also part of township 30 in the same range.

On June 10 we moved to township 30, range 1, west of the second meridian, where we retraced sections 1, 2, 3, 4, 5 and 6 adjoining the headquarters of the Doukhobor colony at Veregin station. This colony at the time of my visit were preparing to leave for British Columbia. Their lands and other properties were being offered for sale including a grist-mill and elevator together with a residence for help, valued at \$52,000, a brick manufacturing plant and a wholesale warehouse with office and store. We also made a traverse of Whitesand river across section 36 in this township and surveyed a school site on section 4, township 30, range 2. We then returned to Kamsack to make a resurvey of sections 22 and 27 in township 29, range 32, west of the principal meridian.

Our next work was in township 28, range 5, west of the second meridian, where we retraced several sections. On August 2 we left for township 2, range 12, west of the second meridian and made a complete new survey of the township. The land in this township is good and although there was little rain during 1910 crops were very fair. The district has been retarded by lack of railway facilities but the Canadian Pacific railway has a branch now under construction westward from Estevan.

Our next work was some retracement surveys in township 20, range 21, west of the principal meridian which we completed on October 3 and then proceeded to Tyn-dall to make retracement surveys in townships 13, ranges 6, 7 and 8 and township 14, range 7, east of the principal meridian. These surveys kept us busy until the close of the season.

APPENDIX No. 13.

ABSTRACT OF THE REPORT OF P. R. A. BELANGER, D.L.S.

MISCELLANEOUS SURVEYS IN ALBERTA AND MANITOBA AND INSPECTION OF CONTRACT

SURVEYS IN MANITOBA.

I organized my party at Winnipeg on April 9, 1910, and proceeded to Sandy lake to reinspect contract No. 33 of 1907. This contract is situated in a district settled largely by Galicians who are converting a bush country, formerly considered valueless, into good farm land.

On May 4 I returned to Winnipeg and after inspecting the iron posts manufactured by the Manitoba Bridge and Iron Works and the Vulcan Iron Works for the Department, I left for Oak Point and Vestfold, a small Icelandic settlement on the west shore of Shoal lake, which I reached on May 9.

I made some retracement surveys in township 19, range 3, west of the principal meridian, and also traversed parts of the lake affected by the lines resurveyed and by the recession of the water. This lake is drying up very fast, and its topography has greatly changed since it was first surveyed. Large tracts of land shown under water by the original survey are now converted into valuable hay meadows which are proving a blessing to the settlers who depend for their living on the dairying industry.

From Vestfold, I proceeded via the north end of Shoal lake easterly to Bender hamlet, a Jewish settlement situated near the Colonization road on the northwest quarter of section 36, township 19, range 1. All the houses, numbering about nineteen, are built in a row east and west along the road allowance on the north boundary of this quarter section, on lots averaging one hundred and forty feet wide by half a mile long. This arrangement has the advantage of keeping the colony together and forms the whole village into one family. A practically inexhaustible well has been dug beside the public road for the use of the whole colony, and it is of great benefit to the public who travel across this dry piece of country.

I understand that all these settlers have homesteads in the neighbourhood of the village. One of them keeps a steam gang-plough for the use of the whole colony, and as he is a blacksmith by trade, he is in a position to repair his machine which is often wrecked on their stony land. There is also a good store, a post-office and a boarding-house in the village, so that people travelling that way are sure to find some accommodation besides good well water, which is a rather scarce commodity in that country.

From this settlement, I drove along the Colonization road southerly to Cossette, and then followed another road southwesterly to the south end of Shoal lake, where I put in several days' work retracing blocks of sections in townships 15, ranges 1 and 2.

Along the Colonization road I noticed some very good farms, principally in the neighbourhood of Cossette, but in township 15 the land is low and gravelly and better adapted for stock-raising. The settlers I met are all doing well in that line by selling cream, cattle, &c.

From township 15, range 1, I proceeded to township 21, range 4, via Oak Point where I spent a day repairing the outfit and having the horses shod, reaching my new work on June 8. Here my survey consisted in the retracement of a few lines and the traverse of lakes which are not shown on the original plans. All these lakes connect

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together in wet seasons by the flooding of the hay marshes which surround them, and form part of what is locally known as 'Island' lake.

From this township I drove westerly and northerly to township 22, range 6, driving for the latter part over a railway grade which lies within a short distance from the northeast corner of the township, which I had to renew. This railway grade is an extension of the Canadian Northern railway branch from Oak Point to Gypsumville. At present the gypsum mines and the winter fish trade are the chief revenue producers for this railroad.

From township 22, I came back along this same railway grade to township 21 where I branched off westerly following a road which led me to Scotch Bay via Pine View and Lily Bay, arriving at Scotch Bay on June 20. After spending a couple of days at that place traversing a small piece of lake Manitoba in township 21, range 7, I proceeded to township 22, range 8, which I reached on the 23rd. Here I spent three days retracing blocks of sections and then proceeded via the regular mail route along the east shore of lake Manitoba to Fairford settlement, where I arrived on July 1 and put in four days' work in the retracement of sections in township 30, range 9 adjoining the Indian reserve.

Fairford is an old Hudson's Bay company trading post, which up to the present time has practically remained unknown to farmers owing to its almost inaccessible position by land. The building of the Canadian Northern railway extension through this place should give it a chance to develop as there are tracts of good land suitable for mixed farming, and though the country is mostly covered with timber or scrub the fish business and the development of the gypsum industry should help to induce settlement in that direction.

From Fairford I drove back to "The Narrows" where I had left my sail-boat in the fall of 1909, and after transferring my supplies and camp equipage from the wagons to the boat, I sent my horses and wagons to Oak Point, and sailed at once to township 30, range 15, where I arrived on July 13. Here, again, I made retracement surveys which occupied ten days, and it was not until the 23rd that I could leave for Pine creek, via Waterhen river and lake Winnipegosis, which had been omitted at the time of the subdivision. I also surveyed a few miles of section lines.

Having completed the work at this point, I sailed back across lake Winnipegosis and down the first part of Waterhen river to the Indian reserve at Waterhen lake where, in order to ensure the safety of the trip down the lower part of the river, I hired an Indian to pilot the boat as far as lake Manitoba as the water was extremely low at that time of the year. I sailed across the lake to Elm creek, a small stream on the east shore in township 26, range 9, where I spent two days reinspecting two townships in Mr. Teasdale's contract of 1909 after which I returned to Oak Point. On August 23 I boarded the train at Oak Point with my party for Sprague, a station on the Canadian Northern railway southeast of Winnipeg, where I arrived on the same day. Here my work consisted in the retracement of one section in township 1, range 13, east of the principal meridian, but my work had to be trebled before a satisfactory closing could be obtained, and it was not until the 29th that I could finish the survey.

The inspection of part of Mr. Molloy's contract of 1909 kept me busy till September 8, and the next day I boarded the train at Culver for Beausejour, and from there proceeded to township 16, range 7, following a graded road which passed through many prosperous settlements.

I spent five days at this new place retracing lines in the vicinity of the Indian reserve, after which I moved camp to Hnausa, via Selkirk, reaching there on September 20.

Sixteen days were employed there surveying the east boundaries of townships 22 and 23 of range 3, which had never been properly surveyed before, and connecting

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the section corners on this outline with the nearest monuments on section chords in both ranges 3 and 4.

This work will prove a blessing to the settlers of that locality, a group of industrious Icelanders, who up to the present have made their living by fishing and a little farming which they increase every year. Owing to the land being heavily timbered the progress must be slow, but the land is very rich and, when it is all cultivated, this Icelandic settlement, on account of its situation near lake Winnipeg, and watered as it is by Icelandic river, will be one of the richest in the Province of Manitoba.

Inexhaustible, large, flowing wells of the purest water are found near the river at a short distance from its mouth on lake Winnipeg.

Large stores, butter factories, fish-packing plants and sawmills are found there, together with a flotilla of steamboats plying on lake Winnipeg.

From Icelandic river I moved to township 24, range 3, where I removed a witness mark wrongly placed on the road allowance, and established a new monument at the true corner after which I proceeded to township 24, range 2, west of the principal meridian where I made a similar correction. From there I returned to Oak point to procure new supplies before continuing further surveys west of lake Manitoba.

I proceeded next to townships 15 and 18, range 10, for the purpose of retracing blocks of sections in the former township which did not close in accordance with the provisions of the Manual, and to investigate in the latter township a section corner which was reported as wrongly marked. While there, I also surveyed a small piece of land in township 18, range 11 which had been omitted in the original subdivision. I then turned southerly to township 9, range 11, where I traversed a small piece of Assiniboine river which had also been left unsurveyed at the time of the subdivision. I might also mention the verification I made of the northeast corner of township 14, range 6.

After surveying one section line in township 16, range 12, east of the principal meridian, I left for Edmonton reaching there on November 11.

The surveys I made in Alberta comprise the traverse of lakes which had been omitted by contractors in different townships west of the fourth and fifth meridians, together with the survey of a few section lines across the beds of lakes in townships 45 and 46, ranges 16 and 17, which had dried up and are now converted into good hay land. I also verified and rectified the position of survey monuments in township 32, range 15, west of the fourth meridian.

These new surveys, though not extensive, occasioned much travelling and kept me busy up to December 15 when I closed operations for the season.

APPENDIX No. 14.

ABSTRACT OF THE REPORT OF G. H. BLANCHET, D.L.S

MISCELLANEOUS SURVEYS IN THE RAILWAY BELT, BRITISH COLUMBIA.

After several days spent in organizing the party at Kamloops, we left for our first work in township 22, range 11, west of the sixth meridian, arriving there on April 16.

This township is crossed from east to west by Shuswap lake, the south shore of which is formed approximately by the centre line of the township. South from the lake there is a narrow fringe of low-lying land not exceeding twenty chains in width. Beyond this the land rises with varying steepness to an elevation of about seven hundred feet above the lake, the summit being about half a mile south of the lake at the west side of the township and nearly two miles from the lake shore at the east side. This slope seems to be well adapted to fruit growing, the soil varying from a clay loam to a sandy loam and gravel, and though surface water is scarce water is apparently easily obtained in wells.

Continuing south from the summit of the above-mentioned slope, a descent of a couple of hundred feet is made to the level of the Canadian Pacific railway main line. This slope is drier than the northern declivity, but the valley bottom is fertile and well watered, being probably best adapted to hay, grain, root crops and small fruits.

In the southern part of the township are to be found the lower slopes of the Black Hill mountain, which become high and rugged in the southwest corner. The lower slopes are well watered and seem suitable for any form of agriculture.

Good roads render all parts of the township easily accessible and the railway provides convenient commercial connections.

On the completion of the surveys in this township, I proceeded on May 27 to township 23, range 8, west of the sixth meridian, which was reached by a gasoline launch from Sicamous.

The portion of this township considered lies between the two arms of Shuswap lake, known as the "Long Traverse" and the "Sicamous Branch," which are joined by the Cinnemousun narrows. It has the appearance of a peninsula, the rib of which starts at the narrows and reaches a maximum elevation of about 1,500 feet above the lake in the southeast quarter of section 22. From here there is a rugged spur which continues south to the lake, making the easterly side steep and rocky. The main ridge, however, swings off to the southwest and, descending and broadening, forms a rolling upland with an elevation of about 1,300 feet in the southwest corner of the township. This small plateau and the declivities and benches by which it descends to the northwest, to the level of Shuswap lake, were the only portions considered to have agricultural possibilities.

The original rocky core is not very deeply buried at any point and frequently outcrops in bluffs and escarpments, most frequently in the northern portion. A seepage from the northeasterly slopes of the Bastion mountains supplies moisture, and although there are no permanent streams, springs occur at intervals, indicating a probable underground flow.

In the descent from the upper plateau level to the lake, two benches break the steepness of the slope. The first has an elevation of from 500 to 800 feet, and varies in width from over half a mile in the western side of the township to less than a quarter of a mile in section 21. The second bench extends back from the lake shore three-

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quarters of a mile in the west of the township and gradually narrows till it finally runs out altogether in section 20, beyond which the shore is steep and rocky.

As might be expected, the soil is almost everywhere rocky in the upper benches, being mainly of whitish clay, except in a few places where the humus has escaped the fires, which have destroyed most of the big timber. On the lower bench, however, the soil is mostly sand and gravel.

To render the higher lands, here considered, accessible for settlement, it is probable that a high-level road would have to be opened up. This could probably be done by extending the White lake trail eastward through township 23, range 9, to this township.

On the completion of the work in township 23, range 8, I moved the outfit to Canoe Point, section 29, township 21, range 8, where Salmon Arm branches off Shuswap lake. Here there is a low-lying bench already disposed of, on which excellent results have been obtained on a small scale in fruit, vegetables and grain. Back of this flat the ground rises rather abruptly towards the Bastion mountains. Portions of sections 30 and 32 on this slope were surveyed. The soil is, for the most part, a whitish clay with rocky outcrops and scattered fragments, except on the small flats where the humus has been able to accumulate.

An examination was made of township 22, range 8, which is crossed from north to south by Shuswap lake. On the easterly side the Shuswap mountains rise abruptly from the shore, which is, for the most part, extremely rugged, except about the mouth of Eagle river, where there is a small flat already disposed of. On the west side of the lake the conditions are very similar, the Bastion mountains forming a shore line inaccessible to the agriculturist, except in several places where large streams have cut gorges through the mountains, depositing the debris in miniature deltas, which have already been disposed of. A small bench of good land was found in the portions of section 32 and the northwest quarter of section 29, west of the lake. This was surveyed.

Proceeding by gasoline launch up Mara lake, portions of sections 2 and 3, township 21, range 8, were subdivided. The land here exhibited the general characteristics already described, the Hunters range forming the easterly shore of the lake, and only the lower slopes being suitable for agriculture.

I left Shuswap lake on August 18 for the lower Columbia river to undertake several surveys between Revelstoke and Arrowhead, in township 21, range 1, west of the sixth meridian, and townships 20 and 21, range 29, west of the fifth meridian.

Columbia river runs through the northeast quarter of township 21, range 1, west of the sixth meridian, the southwest quarter of township 21, range 29, and the northwest quarter of township 20, range 29, west of the fifth meridian, and the lands surveyed formed parts of the flats and the lower slopes of the mountains bordering the river. On the easterly side of the river the higher land backing the river flats is bare and rocky, but farther back there may be lands of agricultural value, now included in timber berths. The elevation of the river flats is, for the most part, sufficient to eliminate any danger of flooding by the river, while those portions liable to flood could probably be utilized as hay lands. The flats have been heavily timbered with large cedar, which are rapidly being converted into lumber. On the west bank of the Columbia the conditions are similar to those just described, except that the width of the flat is greater and that less of the timber has been removed.

The islands are for the most part merely overgrown sand-bars, flooded at high water. Water is abundant and of good quality throughout this portion of the Columbia valley.

On the completion of the surveys in these townships I moved to Revelstoke to survey timber berth No. 539, lying on the westerly slope of Mt. Mackenzie.

Up to this time the weather had been warm and remarkably fine, but the fall rains now commenced and continued with few interruptions until early in November.

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when the rain changed to wet snow. This weather caused much interruption to the work during the latter part of the season.

I next proceeded with surveys in township 23, range 2, west of the sixth meridian. Owing to the advanced season I considered it advisable to undertake the work on the hills on the west side of the river first. This work embraced the lower foot-hills of Mt. McArthur, which, though in places rough, contains a considerable quantity of agricultural land lying between the rock bluffs. Some of these valleys are old beaver meadows which would require draining.

The large timber has been burnt off, except on the upper slopes of the mountain, and in section 3, where a heavy growth of cedar, tamarack, fir and pine still remains.

The Provincial Government is building a road south through this part of the township, which is to form part of the proposed Revelstoke-Arrowhead road, and which will promote development in this district. There are many prospective settlers anxiously awaiting an opportunity to take up homesteads here, as the proximity of Revelstoke renders this a very desirable locality.

On the east side of Columbia river the conditions are somewhat different. Instead of the foot-hills, as on the west side, we have a series of three almost level benches, dropping sharply from one level to the next. The lowest of these benches includes most of section 1 and portions of sections 2, 11 and 12. It is much cut up by sloughs and is covered with cottonwood, willow and alder and in some parts cedar. It is probably best adapted for hay lands, and hay at the local price of from \$20 to \$35 a ton makes a valuable asset. It could also produce vegetables and grain on the higher ground.

The second bench, including most of section 14 and the southwest quarter of section 13, is probably best adapted for garden produce, hay and grain. The higher ground and the lower slopes of Mt. MacKenzie seem suitable for any form of agriculture, good fruit being raised here.

APPENDIX No. 15.

ABSTRACT OF THE REPORT OF M. P. BRIDGLAND, D.L.S.

TRIANGULATION SURVEYS IN THE RAILWAY BELT, BRITISH COLUMBIA, AND MISCELLANEOUS
SURVEYS IN ALBERTA AND SASKATCHEWAN.

I left Calgary on May 31 for Golden and after a few days arranging for my party and outfit we proceeded to Revelstoke, and began field operations on June 8.

The first mountain to be ascended was mount Mackenzie, near Revelstoke. A camp was placed at the base of the mountain where the Canadian Pacific railway crosses Illecillewaet river, about two miles east of the town. The slopes here are very steep, but as the timber has been burned off and there is not much undergrowth, they offer an easy means of ascent. Much snow was encountered on the upper slopes. On reaching the summit it was too hazy to obtain any satisfactory view, but a cairn was erected in the position of the station occupied by Mr. A. O. Wheeler in his photographic survey of the Selkirk range, 1901-02. No permanent marks were made.

On our return to camp, one day was lost owing to wet weather, and then the party started for Carnes creek at the north limit of the railway belt. Mr. Carson's secondary cairns erected the previous year on Roseberry mountain and Carnes mountain were located, and a high peak to the northeast of them was climbed and selected for a station. Unfortunately, owing to the depth of snow on the summit, it was found impossible to erect a suitable cairn. This was done later during a prolonged spell of smoky weather. This mountain is about 9,800 feet above sea-level and lies to the east of the north fork of Carnes creek.

It is rather difficult to reach, but is the only peak in the vicinity suitable for a station. The view from here is magnificent, and typical of the Selkirk range, consisting of deep, narrow valleys, heavily timbered, and glacier-crowned peaks rising proudly from the dark green slopes below. Snow fields and glaciers are visible in every direction, and to the northeast that unclimbed monarch of the Selkirks, mount Sir Sandford, rises high above all others. This station was called signal XXXV.

Our next trip was to establish a signal on mount Copeland, a prominent peak up Jordan river and about fifteen miles northwest of Revelstoke. There is an old trail leading up this stream, but it had not been used for years and was in very bad condition, necessitating much cutting. The valley is from a quarter to half a mile in width, with very steep, rocky slopes on both sides. There is much excellent cedar and hemlock in the valley and on some of the lower slopes, and also a most luxuriant growth of fern and devil's club. We succeeded in getting horses about nine miles up the stream and were then compelled to send them back and proceed on foot, owing to the lack of pasture and the poor condition of the trails. From here we followed the Jordan, which turns north at this point, for about four miles. Here the old trail turns west up a narrow valley leading to some old mining claims. This trail we followed for about three miles through dense alder slides, and finally pitched camp about 500 feet above the valley on the north slopes of mount Copeland (9,700 feet), which we climbed the day following. A hole was drilled in the rock at the centre of the base of the cairn to receive the brass bolt usually used for marking stations, and a hole drilled for a reference bolt seven feet south. The cairn is five feet seven inches in diameter at the base and seven feet high, and was called signal XXXVII. This trip occupied in all nine days.

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On returning to Revelstoke angles were read at the northeast corner of section 33, township 23, range 2, west of the sixth meridian, to connect the corner with mounts Mackenzie, Cartier, Begbie and Copeland. A trip was then made to the long tangent on the Arrowhead branch of the Canadian Pacific railway to find a suitable base for connecting mounts Mackenzie, Cartier and Begbie with the Dominion Lands surveys.

On July 3, a start was made for mount Begbie to the west of Revelstoke. Crossing Columbia river by the bridge at this point, we travelled south about four miles by means of a settler's trail. From here the horses were sent back and we proceeded on foot about three miles farther south to the base of mount Begbie. Camp was pitched at night on the side of the mountain about 2,000 feet above the Columbia valley. Much to our delight, the following day was fine and beautifully clear. The mountain offered no difficulty and we were on the summit by nine o'clock. A cairn was erected, five feet in diameter at the base and eight feet seven inches high. In the rock at the centre of the cairn a hole was drilled to receive the brass bolt and four holes, each distant six feet from the central hole and bearing north, east, south and west respectively, were drilled for reference bolts. This cairn was designated as signal XXXVIII. The trip to this mountain and return occupied only three days.

On returning from mount Begbie, preparations were at once made to visit the Incomappleux valley. Horses and outfit were shipped by train to Arrowhead and thence by boat to Beaton, a small village at the head of the Arrow lakes. From here an excellent wagon road leads up the river to the almost deserted village of Camborne, about six miles distant. On the way the road passes through a fine canyon about a mile in length.

Ten years ago Camborne was one of the busiest mining camps in British Columbia, but now there are only three or four families remaining. Four mills have been built, but they are all lying idle and one, at least, is in ruins. The country is all divided into claims, but no work, other than assessment work, is being done. The ore is chiefly quartz-bearing free gold, and some very rich samples were shown to us by people living there.

The valley above Camborne consists of a low flat about half a mile wide with steep mountain slopes on both sides.

The bottom-land appears very fertile and would yield good crops if cultivated. There is much excellent cedar and hemlock in the bottom of the valley and on the lower slopes.

On leaving Beaton, camp was taken to the mouth of Menhinnic creek, about one mile above Camborne. At this point there is a bridge across Incomappleux river, making it a very convenient base of operations for work on either side. On the west side of the river, a trail starts up Menhinnic creek and then turns across the mountain, leading to several claims high up on the slopes, the highest being the 'Burniere' near the edge of timber-line. This trail had been recently repaired and was in good condition. A good wagon road also leads up the west side of the river for several miles. About four miles above camp another trail leads up Sable creek to the Trilby basin. This is also a mining trail, but has not been used for some years and is in very bad condition. On the east side of the river there is a good trail for about twelve miles. There are also several branch trails, one at Camborne leads up Poole creek to 'The Silver Dollar' and other properties, about five miles farther up another trail leads up Lexington creek and a little farther on still another leads up the face of the mountain to a claim known as 'The Mammoth.' The main trail turns up Boyd creek, about twelve miles above Camborne.

Some difficulty was experienced in finding a suitable station in this locality as signal XXVII, which it was necessary to see from this point, was placed on a shoulder of North Albert peak. Eventually a peak about 8,000 feet above sea-level, a little to the northwest of Camborne, was selected. A cairn five feet in diameter at the

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base and eight feet seven inches high was erected. This was designated as signal XXXII. Two secondary cairns were also erected, one at the head of Trilby basin and another on Kelly peak, a high peak on the east side of Incomappleux river and a short distance above Kelly creek.

This trip occupied in all sixteen days. The weather was very warm and smoky, but it was singularly fortunate that the smoke cleared off every day we climbed.

Leaving Camborne, we next moved to Comaplix on the north shore of Arrow Lake. This is a busy little lumbering town, the headquarters of one of the mills of the Bowman Lumber company. The smoke from a large fire across the lake was so dense that it was impossible to see any distance. Fortunately some heavy rains settled the smoke and we started for mount Sproat. Camp was taken by boat to a point about three miles west of Comaplix and thence up an old trail to a point about two thousand feet above the lake. Next day the summit was reached after a long and tedious climb. Owing to storms while on top it was impossible to do anything except build a cairn. This cairn was five feet six inches in diameter at the base, eight feet six inches high and was numbered signal XXXIII. During the ascent of this mountain we encountered on the upper slopes an old grizzly and two cubs. Next morning we returned to Comaplix, took the boat to Arrowhead and went by train to Revelstoke, reaching there on the evening of July 26.

On July 28, as it was very smoky with no indication of rain, we decided to revisit signal XXXV and erect the signal we were unable to build before. The signal was five feet in diameter at the base and eight feet two inches high. This trip occupied six days, during all of which time it was too smoky or cloudy to make any observations.

On our return to Revelstoke, we were again delayed some days by unfavourable weather. We then set out to place a signal on mount Cartier to take the place of the one formerly erected on mount Mackenzie, which had proved to be unsatisfactory. Horses were taken to the end of the road about five miles south of Revelstoke, and then the party proceeded on foot. The brush proved very bad and the distance greater than we had expected, so it was not until the afternoon of the following day that we reached timber-line below the peak. On the third day mount Cartier was ascended and angles read where possible. Owing to smoke and local thunder-storms no satisfactory results were obtained.

This station was called signal XXXIV. It was marked by a brass bolt cemented in a hole drilled in the solid rock. The bolt was stamped with the number of the triangulation station, followed by a triangle having its apex at the centre of the head of the bolt. For reference points two iron bolts were cemented in holes drilled in the rock six feet north and south respectively of the geodetic point. Surrounding the permanent mark, a conical stone cairn was built, five feet in diameter at the base, one foot six inches in diameter at the top, and eight feet high. The cairn was placed in the position of the photographic station occupied by Mr. A. O. Wheeler in his topographical survey of the Selkirk range, 1901-1902.

The return trip was made on the fourth day by way of what is known as 'the green slide.' This is a long open slope swept clear by frequent avalanches, and proved a very easy means of descent to the railway. From there we walked back to Revelstoke, a distance of about nine miles.

We next moved to Three Valley, a small lumbering town fourteen miles west of Revelstoke, to establish a station on Griffin mountain, leaving the pack-train at Revelstoke in charge of one of the men. Three days were lost through smoke and wet weather. On August 16 we started for the peak, commencing the ascent at a point on the railroad about a mile and a half west of Three Valley. Our path led up steep slopes which had been burned over many years ago and were nearly free from underbrush. Blueberries were found in great abundance. On reaching the summit of the ridge, we turned westward along the ridge until the highest point was reached.

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Here a disappointment awaited us, for we found that a slightly higher peak, some distance south and on the same ridge, cut out everything in that direction. Accordingly we turned back and followed the ridge to the other peak, which we reached about one o'clock, after a climb of nine hours. Further delay followed on account of clouds, and it was nearly six o'clock before we started for camp. Fortunately it was a fine moonlight night and we reached camp safely about half past nine.

This mountain (signal XXXIX) although low, is excellently situated for a station. It was marked by a hole drilled in the solid rock. Over this hole a cairn was erected five feet in diameter at the base, two feet in diameter at the top, and nine feet two inches high.

Craigellachie was then visited to ascertain the truth of certain rumours regarding a trail up the north fork of Eagle river and also of one up Queest mountain. We found that there was an old trail for about twenty miles up the north fork of the Eagle, but we could not find any up Queest mountain. The trail up Eagle river is rough and will require considerable chopping, but it will be very useful in establishing a station near the north limit of the railway belt north of that point. It was originally built by lumber companies in order to get some of their limits surveyed. As the weather was still unfavourable and feed scarce, it was decided not to bring the horses, but to move to Salmon Arm and make use of the bad weather to locate a base line.

On August 20 I went to Revelstoke and made arrangements for shipping horses and outfit to Salmon Arm. In the evening I returned to Craigellachie, and the following day moved to Salmon Arm. The remainder of the outfit did not arrive until August 23.

On the 24th a start was made for the Hunters range on the east side of Mara lake. Throughout this district good wagon roads have been built in all the principal valleys. We followed the Enderby road for about nine miles and then turned north to Mara. Crossing Shuswap river by means of the bridge at this point, we camped at Mr. Blurton's, near whose place an old Indian trail ascends to the summit of the range. As this trail was very nearly obliterated, I decided to get Mr. Blurton to accompany me for a few days.

The following morning we started for the summit of the range. Until an elevation of 4,500 feet was reached the trail led through green timber, chiefly small fir, poplar and willow. It then entered a tract of old brule where it was almost impossible to follow it, as it wound in and out among burned logs and fallen trees. After travelling through this for about three hours we reached the summit of the ridge. This summit consists of rolling benches with large open meadows and clumps of scattered spruce and balsam. Country of a similar nature extends from here to Griffin mountain above Three Valley, a distance of about twenty-five miles. Camp was pitched that night in a beautiful open meadow about three miles from the point where we first reached the ridge. Next day we travelled about ten miles farther north to the base of the highest peak on the range, about 7,300 feet above sea-level.

In the meantime the smoke had become so dense that it was impossible to see anything half a mile away. The peak was ascended and a cairn erected, but we were unable to decide whether or not it was suitable for a station. When the weather cleared some days later it was found necessary to place the cairn on a ridge about one mile south and about one hundred feet lower.

The station was marked by a hole drilled in the solid rock to receive the permanent brass bolt. With this hole as a centre the cairn was built, having a diameter of five feet six inches at the base and a height of nine feet six inches. The cairn is situated on the solid rock ridge affording an excellent location for permanent marks. This station was designated as signal XLII.

On September 3 we left Mara and moved down to Enderby, where we remained over Sunday. On Monday we started for Mabel lake, following a good wagon road

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which leads up the Shuswap valley to the lake, a distance of about twenty-four miles. There is considerable good land in the valley, but much of it is held in timber limits, which are not likely to be thrown open for settlement until the timber is taken off.

In order to reach mount Mabel we borrowed a boat from the A. R. Rogers Lumber company, and took a light camp to the mouth of Cottonwood creek. Here we found an old Indian trail leading to timber-line, and by means of this trail the ascent was made. There is some good cedar, hemlock and fir on the mountainside, but the slopes are so steep that it would be very difficult to get it out.

As time was short and loose rock was very scarce, a cairn was not erected. A hole was drilled in the solid rock to receive a permanent bolt and the butt of a tree eighteen inches in diameter and nine feet high was carefully centred and plumbed over the hole. This was securely braced and a piece of white cotton tacked around the upper end. This was designated as signal XLI.

Two days were spent looking up the position of some of the Dominion Lands survey posts in the vicinity and a secondary signal was also erected on Trinity hills, about half way between Mabel lake and Enderby, on the south side of the valley. This trip occupied eight days, during all of which time the weather was cloudy and showery.

On returning to Enderby, a secondary station was placed on a low rocky hill near the northeast corner of section 22, township 19, range 9, west of the sixth meridian. The party then moved to Salmon Arm, where much of the remaining time was devoted to work on the base line.

During a few days of fine weather, a trip was made to mount Ida. Considerable difficulty was experienced in finding a suitable station as the top of the mountain consisted of a rolling flat, heavily timbered. This made it necessary to visit practically every ridge on the summit. A sharp knob on the eastern side of the mountain was finally selected as a suitable point. This is not the highest part of the mountain, but it offers a good view in most directions and is the most favourable point for connecting with the ends of the proposed base in the valley.

Advantage was also taken of two or three fine days to visit Granite mountain and see if it would be possible to obtain a station thereon, from which the ends of the proposed base could be seen and also the peaks necessary for further expansion. It was found that the summit of this mountain consisted of a rounded rocky ridge heavily timbered with second-growth jackpine. A suitable point was selected on a shoulder about twenty feet below the summit and a temporary signal erected. Lines of sight were also cleared to existing signals and to some of the other peaks likely to be useful for stations.

During the last month of the season, much of the weather was too cloudy or smoky for work on the summits, and much of the time was spent trying to secure a suitable location for a base line. For this purpose a line a little over five miles in length was located, commencing on the east side of Salmon Arm of Shuswap lake, about one mile northeast of the town. From here it runs in a southwesterly direction, passing along the shore of the lake and through the Salmon Arm Indian reserve. This line was cleared out so that the ends were intervisible, but no attempt was made to prepare it for actual measurement.

On September 21, instructions were received to close work in the mountains as soon as possible, in order to attend to some miscellaneous surveys in Alberta and Saskatchewan. Accordingly on October 11 arrangements were made for shipping the horses and outfit back to Golden. Here the outfit was stored and the horses sent out to Mr. McKeeman's ranch, about thirty miles south of Golden for the winter.

During the season the work was greatly retarded by rain and smoke. During the interval from June 1 till October 10 it had rained on thirty-nine days and was very smoky and hazy on twenty-nine other days, a total of sixty-eight days out of one hundred and thirty-two. This does not include days on which the clouds were hanging low on the peaks, a condition almost equally unfavourable for work.

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The district around Salmon Arm and the Shuswap valley is in a very prosperous condition. Long ago, all the available land in the valleys was taken up for farming. Recently much attention has been given to fruit growing, and this has resulted in much land on the mountain slopes, formerly considered worthless, being taken up by settlers. The limits of the useful land are still being extended and it is impossible to say where cultivation will eventually cease. During the season of 1910, there was a very heavy crop of apples, pears, plums and small fruits, and nearly all the settlers engaged in fruit growing were enthusiastic about their success.

Miscellaneous Surveys.

On October 15, in accordance with your instructions of September 25, a small survey was commenced in the northeast quarter of section 18, township 24, range 1, west of the fifth meridian. This survey was completed on October 19.

Then, accompanied by one man, I went to Swift Current. Two correction surveys were made in this vicinity, one in section 2, township 18, range 14, and the other in section 9, township 12, range 12, both west of the third meridian.

On completing this work, I moved to Moosejaw. Here a resurvey was made of some of the lines in township 15, range 26, west of the second meridian, and some duplicate monuments destroyed.

On November 1, I moved to Moosomin where a survey was made in township 13, range 32, west of the principal meridian to ascertain which of some duplicate monuments were correct.

I next proceeded to Brandon, and thence to Forward, stopping on the way at Redvers to make a small correction survey in section 6, township 8, range 31, west of the principal meridian. At Forward two surveys were made, one a traverse of a lake in section 31, township 7, range 19, west of the second meridian, and the other a traverse of part of a lake lying in section 6, township 5, range 19, and section 1, township 5, range 20, west of the second meridian.

On November 13, I arrived at Moosejaw and received there instructions to make a survey of a lake in section 15, township 9, range 23, west of the second meridian. Accordingly I returned to Milestone and drove out to the above section. I completed this survey and returned to Milestone on the evening of November 16.

Leaving Milestone the same evening, I reached Maple Creek the following morning and made arrangements to drive out to section 21 township 7, range 29, west of the third meridian, where a survey was to be made of the old Northwest Mounted Police burial ground at the old site of Fort Walsh. This survey was finished and on November 20 we returned to Maple Creek. Transportation was furnished for this survey and every possible assistance rendered by the Mounted Police.

The following day we started along the Crowsnest line of the Canadian Pacific railway for Macleod. Three surveys were made along the line; one was a correction survey near Purple Springs on the east boundary of section 17, township 10, range 14, and the second was a retracement survey on the correction line between townships 10 and 11, range 19, both west of the fourth meridian. The third was a traverse of Belly river in sections 13 and 24, township 9 range 23, west of the fourth meridian. The north bank of the river through these sections was traversed, but owing to the river being partly frozen and full of floating ice, it was found impossible to cross to the other side.

On December 1 and 2, a traverse was made of a lake lying in section 4, township 21, range 27, west of the fourth meridian, and then I returned to Calgary where a traverse was to be made of Bow river through township 24, range 2, west of the fifth meridian. This was completed on December 9.

I then went up to Didsbury and made a small correction survey near there, on the north boundary of section 11, township 31, range 1, west of the fifth meridian.

On returning to Calgary some additional work was done in the northeast quarter of section 18, township 24, range 2, west of the fifth meridian, and on December 15 I closed work for the season.

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APPENDIX No. 16.

REPORT OF E. L. BURGESS, D.L.S.

MISCELLANEOUS SURVEYS.

OTTAWA, March 15, 1911.

E. DEVILLE, Esq., LL.D.,
Surveyor General
Ottawa.

SIR,—I have the honour in accordance with my instructions to submit the following report on the miscellaneous surveys which I made during the past year.

On Sept. 3, 1910, I received instructions to survey the ordnance lands lying in lots 39 and 40 of the first concession, Ottawa front, township of Nepean, now within the limits of the city of Ottawa.

The survey was proceeded with immediately. After locating the boundaries of these lands I produced Bell street, Division street, LeBreton street and Rochester street through them to Carling avenue and submitted a plan showing these streets as well as the topography and the improvements on the land. I was then instructed to prepare a method for subdividing the land into city lots. This was done and the lots subsequently marked on the ground.

At the completion of the survey on Nov. 30, I received a message from J. P. Dunne, Esq., of the Ordnance Lands Branch, stating that the Deputy Minister of the Interior had ordered the work to be stopped as the Ottawa Improvement Commission was negotiating with the Department for the property in question. As no decision has been arrived at so far as I am aware as to the disposal of the property no further action has been taken in connection with the survey.

On Jan. 14, 1911, I received instructions to locate the contour line from the spill-way of the dam then being erected on Sturgeon river by the Municipality of Fort Saskatchewan in section 22, township 55, range 22, west of the fourth meridian and to traverse Sturgeon river from its mouth across sections 21 and 22 connecting with the traverse the dam and power works and to survey the boundaries of section 22. The chief object of the survey was to determine whether any lands other than those owned by the municipality would be flooded by the dam. It was found that a considerable area of land in sections 27 and 28 which I believe are not owned by the municipality would be so flooded. Sturgeon river was, therefore, surveyed across these sections and the extent of the area required for flooding purposes determined.

I was engaged in the field on this work from January 20 to February 6. My party consisted of two labourers.

I have the honour to be, Sir,
Your obedient servant,

E. L. BURGESS, D.L.S.

APPENDIX No. 17.

REPORT OF ALAN J. CAMPBELL, D.L.S.

EXAMINATION OF LANDS IN THE RAILWAY BELT, BRITISH COLUMBIA.

CALGARY, ALBERTA, February 24, 1911.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I beg to submit herewith my report regarding the operations of my parties engaged in the examination of undisposed of lands in the New Westminster district of the railway belt of British Columbia.

In accordance with your instructions, received through Mr. A. O. Wheeler, D.L.S., I took charge of the examination of lands in the New Westminster district. Two parties were placed in the field, one in charge of G. A. Bennett, D.L.S., worked in the Chehalis and Harrison lake country and northward along the Fraser valley, while the other in my charge worked in the vicinity of Stave, Lillooet and Pitt lakes and westward. The report of Mr. Bennett, giving details of his operations, is submitted herewith.

I left Calgary on May 12 and proceeded to Vancouver, where I procured my outfit. It was thought advisable, as there were so many lakes lying in the country to be examined, to provide the parties with canoes for the purpose of transporting the camp outfit, and for use in working around lakes. Two Peterborough canoes were purchased for each party and were found of great service.

The examination of lands was commenced on May 19 at Nicomen and the lands in the vicinity of that place and of Dewdney, including the valley of Suicide creek, were gone over.

On May 28, Mr. Bennett arrived and I immediately proceeded to Vancouver to procure for him the necessary outfit and supplies and also to hire men. In the meantime he was in charge of my party and was carrying the work forward. On June 2 Mr. Bennett took charge of his party and started on the examination of lands at Nicomen, working from there eastward.

By June 1 the lands in the vicinity of Nicomen and Dewdney were completed and the party proceeded with the work of examining the lands in the vicinity of Durieu or Hatzie Prairie. This was completed by the 14th and a move was made to the vicinity of Stave lake. Between June 15 and July 9 the lands around the south end of Stave lake and those lying in the vicinity of Stave river were examined, the latter being reached by flying camps. There being no survey posts on the west side of Stave lake and being unable to locate more than a very few of those on the east, it was necessary to make a traverse of the lake so as to be able to describe the lands adjoining the lake by sections and quarter sections. Accordingly a traverse was run along the west side of the lake and up North Stave river and for some distance up Cypress and Clearwater creeks. The lands in the vicinity were also examined and the work around Stave lake was finished on July 28.

I had intended to move the camp across the ridge between Stave and Lillooet lakes, but on exploration found that it would be just as expeditious, if not more so, to reach the Lillooet lakes by moving down to the Fraser and going in from Haney. Accordingly we moved down to Stave falls by canoe, and, by the kindness of the superintend-

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ent at the power works there, were allowed the use of a team to transport the camp to Ruskin. From Ruskin we moved to Haney via Fraser river, and from Haney by wagon to Lillooet river.

The period from August 2 to 11 was spent looking over lands in the vicinity of Lillooet river and camp was then moved to Lillooet lake. The river being unnavigable, it was necessary to pack the camp outfit on our backs.

During this period I visited Mr. Bennett's party to see how he was progressing and to make arrangements for future work.

There being no survey posts in the neighbourhood of Lillooet lake, it was necessary to make some surveys. This was done by traverse and by carrying a system of triangulation up the lake, the lands being examined by lines run from the traverse points. The time between August 12 and September 7 was occupied in this work and in the exploration of Gold creek valley.

The lands on the southerly slopes between Lillooet river and the North Lillooet and across to Pitt meadows were then examined. This work was finished on September 30, and a move was then made to the Pitt lake country and the examination carried on in that region and in the vicinity of Pitt river, which was completed on October 28. The period from October 29 to November 8 was spent in examining the lands to the east of Coquitlam river, and from November 9 to November 15, those on the west side of the river.

On September 28 rain started and fell nearly steadily until October 8; from then the weather was very unsettled and it rained at frequent intervals, making the work on which we were engaged very disagreeable. On November 16 the party moved to Westminster Junction and the men were paid off. Mr. Bennett's party came in on the 17th and was also paid off.

Mr. Bennett and I spent a day at Vancouver collecting data as to lands disposed of and we then started for Calgary arriving there on November 20.

The following methods and instruments were used in conducting the examination. If the lands lay within surveyed territory, the survey lines were traced and auxiliary lines run to gather sufficient information to make a complete report of the lands examined. In unsurveyed territory triangulations, traverses and approximate production of the township subdivision lines were made so as to collect the necessary information regarding the lands examined.

For triangulation work, transit instruments were used, and for traverses a transit surveying compass, a sixty-six foot chain, and a stadia rod.

In the land examination direction was kept by military pocket compasses and distance measured by chain, stadia hand-levels and by pacing with the assistance of a tally register. Elevations above sea-level were obtained by aneroid barometers which were carried by the examiner. The travelling barometers were checked for fluctuations due to changes in the atmospheric pressure by the readings of a stationary barometer at camp, these readings being taken every hour. The elevations above sea-level were obtained from elevations along the Canadian Pacific railway by James White, Geographer. The stationary barometer readings were checked with these elevations wherever possible.

I have the honour to be, Sir,

Your obedient servant,

ALAN J. CAMPBELL, D.L.S.

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REPORT OF G. A. BENNETT, D.L.S., ON OPERATIONS IN EXAMINATION OF LANDS IN THE NEW WESTMINSTER DISTRICT.

CALGARY, ALTA.

February 21, 1911.

ALAN J. CAMPBELL, Esq., D.L.S.,
CALGARY, ALTA.

SIR,—I have the honour to submit the following report on my season's work of examining lands in the New Westminster district of the railway belt.

On May 23, in accordance with a letter of instructions from the Surveyor General dated May 18, I started for Nicomen, British Columbia, where I was instructed to meet you. I arrived at Nicomen on the 28th, and finding that you had moved to Dewdney, proceeded there the same day and joined your party. On June 2, with arrangements completed for putting my party in the field, I returned to Nicomen, met the three men you had hired in Vancouver and prepared to make location surveys for the examination of township 24, east of the coast meridian.

Using Nicomen slough and later Harrison bay as a base, the country was examined eastward to the mouth of Chehalis river and finished by June 25. Finding it impossible to use the canoes on Chehalis river the party packed the camp equipage up the Chehalis valley, and completed the surveys and classification of that district on July 29. Using the canoes, Morris lake was then visited and the country adjacent to it was examined, including the lands in the vicinity of Weaver lake. Completing this work on August 3, the party moved to Harrison lake and began the examination of lands on the western side of the lake. These lands, including the islands in the lake were classified by the 23rd and then the party crossed the lake and, beginning with Silver creek valley continued southward the examination of the lands accessible from the eastern shore of Harrison lake. Completing the examination of all lands adjacent to Harrison lake and Harrison river by September 19, the party returned to Fraser river and resumed the work of examining eastward on the north side of the Fraser valley.

In order that the party might safely and expeditiously take the canoes up the riffles of Fraser river an Indian canoe man was engaged. However, because of the heavy continuous rains, which fell during the first two weeks of October, the work of examination was delayed and the river navigation made difficult so that the party did not complete the work to Yale until October 18. To travel farther up the river with the canoes was now impracticable, the high water making the rapids in the canyon above so dangerous that no boat could possibly survive.

On account of the difficulties of transportation in this region, the party now crossed Fraser river and examined the portion of township 6, range 26 and township 7, range 25 east of the river. Therefore it will be unnecessary for another party to come farther up Fraser river than Hope when examining the lands south of the river.

Completing the work in the neighbourhood of Yale by October 25, the camp equipage was transported to Spuzzum by freight. From here surveys were made connecting with those from Yale and the lands in the neighbourhood examined including the Spuzzum creek valley and the lands east across Fraser river consisting of fractional range 26 and township 8, range 25. On October 31 the camp equipage was shipped via Canadian Pacific railway to China Bar and from here lands were examined up to the north limit of the Coast division including the Scuzzy river valley and lower Anderson river valley.

Winter had now begun to set in. From October 1, when the rainy season began there had been almost continual rain which now changed to sleet and snow, and covered the uplands to a depth of from six to ten inches. These weather conditions

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made work such as the party were engaged on very disagreeable, as much of the time had to be spent in flying camps up in the mountains.

The examination of the country to the west of Fraser river in the Coast division was now completed, as well as of lands east of Fraser river, north of township 5, which could be conveniently reached without the assistance of packhorses.

On November 10 the party started for Westminster Junction travelling by railway to Yale, then by canoe down Fraser river to Pitt river where the canoes were stored, and reaching Westminster Junction on the 17th the party were paid off.

After spending a day in the Lands Office at New Westminster gathering data about lands disposed of, I started for Calgary, reaching there November 20.

I have the honour to be, Sir,

Your obedient servant,

G. A. BENNETT, D.L.S.

APPENDIX No. 18.

ABSTRACT OF THE REPORT OF P. A. CARSON, D.L.S.

MISCELLANEOUS SURVEYS IN SASKATCHEWAN.

The miscellaneous surveys on which I was engaged throughout the season were very varied in their nature. They consisted in locating, and correcting where possible, errors in original surveys; reconciling seeming discrepancies in the returns of old surveys; restoring and reestablishing obliterated and lost monuments; determining the areas of small lakes evidently overlooked in the original survey; traversing lakes or rivers whose beds or channels have sensibly altered since the original survey; surveying the beds of a number of prairie lakes which have dried up and conceded many acres of valuable hay and farming land; investigating all manner of communications received by the Department from settlers with reference to surveys. When such matters are brought to the notice of the Department, it is necessary in many cases to investigate the true condition of affairs on the ground, and it has been found that time and money are saved by sending, instead of a whole survey party, merely a surveyor and assistant, who can easily make the necessary investigations and in most instances perform any small surveys required.

The year 1910 was a remarkably dry year, due to the light snowfall of the preceding winter and the drought of the spring and summer. Lakes and sloughs, which during previous years were full of water, were, in 1910, perfectly dry, and produced great quantities of hay. In some cases the dry beds seemed suitable for agriculture and many applications were received for these lands. The question was to decide whether the dryness was a permanent condition or only due to the abnormal drought. The real old timers in some of the districts where this condition of affairs existed affirmed that the wet and dry seasons go in cycles, that they had seen the same dry state before, some fifteen or twenty years ago, and that, if the winter of 1910-11 brought an abundance of snow, these lakes would fill up again. Others claimed that the climate of western Canada was changing, due to the tilling of the soil, that the amount of rainfall is decreasing each year, that the ploughing and growing of crops on the land surrounding the lakes prevented the moisture from seeping to the low levels, and that cutting the hay from the beds allowed the water to dry off more quickly.

From my personal observations I have formed a rather qualified opinion on this subject. In some districts, particularly where the land is fairly level and open, many shallow lakes are at present dry, and I believe will remain so. On the plan of township 37, range 25, west of the third meridian, are shown eight lakes. These must have contained water at the date of survey, July, 1904. In October, 1910, there was not a drop of water in the township, except in lake No. 8, where only a muddy pond of ten acres remained. Some portions of the old beds have been broken and tilled, others are producing hay. In the bed of lake No. 1 which covered nearly a thousand acres in sections 24 and 25, I saw a field of flax yielding between fifteen and twenty bushels to the acre. Similar conditions exist in several neighbouring townships. I believe that the majority of these lakes will remain dry, and even those which contain water at wet seasons will produce hay in the late summer, and should not be excluded from the quarter sections as being useless.

There are, however, a number of lakes which, although at present dry, will probably revert to their normal condition during wet years, for example, Grass lake,

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in townships 37, ranges 23 and 24, west of the third meridian. This lake is four miles long and a mile wide. The banks are from ten to thirty feet high, and the surrounding country is rolling prairie. Although some of the neighbouring land has been broken and tilled, and enormous quantities of coarse hay have been cut from the dry bed, I see no reason why Grass lake will not again contain water. For this reason and as the soil of the bed is of a muck-like nature, the lands of Grass lake will be useful only for haying purposes. Muddy lake in townships 38 and 39, range 22, west of the third meridian is a somewhat similar case, but in this, as in most alkaline lakes, a deposit of alkaline mud lessens the value of the land for hay. The waters of Kill-squaw lake in townships 39 and 40, range 22, west of the third meridian have receded greatly since the subdivision survey in 1903. Many acres formerly covered by this lake are now arable, many more are hay producing, while unfortunately in some quarter sections foxtail, or wild barley has grown so luxuriantly that any useful growth is smothered.

These are but a few of the numerous cases of a similar nature each of which must be investigated individually to be dealt with at all.

In addition to the miscellaneous surveys, observations were taken at the different localities for magnetic declination, dip and total force, these observations not materially retarding the regular work. One hundred and sixty observations for magnetic declination were obtained, with a Bausch and Lomb trough compass attached to the standards of a Watts transit. The index correction of the compass was determined at the Agincourt magnetic observatory, both at the beginning and the end of the season.

The observations for dip and total force were made with a Dover dip circle, according to Lloyd's method. Two complete observations for each were taken at twenty-three stations. The constants of the dip circle were determined at Agincourt, both at the beginning and the end of the season.

Observations were also taken for the diurnal variation of magnetic declination on several days during the summer. The diurnal variation was also observed every day during the month of November at Rosthern, Sask., in township 42, range 3, west of the third meridian, simultaneously with another observer stationed at Athabaska Landing, Alberta. My assistant observed for diurnal variation and as well for dip and total force.

APPENDIX No. 19.

ABSTRACT OF THE REPORT OF WM. CHRISTIE, D.L.S

SURVEY OF PARTS OF THE EIGHTEENTH AND TWENTIETH BASE LINES WEST OF THE FOURTH MERIDIAN.

During the winter I arranged to have my season's supplies forwarded to Cold lake, and on May 9 I left Prince Albert for the survey by way of Lloydminster. With my party I reached Cold lake on May 20, and proceeded thence by the wagon road around the west shore of Cold lake and Primrose lake to the intersection of the meridian and the eighteenth base. We commenced work on May 31, leaving our wagons behind and moving all the season by pack-train. The work was pushed vigorously ahead and on August 17, we reached range 13, to which point the base had been previously established.

We then started back over our own trail and reached the fourth meridian August 26. We then followed the trail made by Mr. J. N. Wallace when surveying the fourth meridian and arrived at the intersection of the twentieth base, September 5. We surveyed this base across nine ranges, and, on October 31, our supply of oats being exhausted and forage being poor, we closed operations for the season and arrived back in Lloydminster, November 28.

The country along the first six ranges of the eighteenth base consists of sandy ridges covered chiefly with jackpine together with some poplar and small spruce, alternating with large muskegs and tamarack swamps. There are practically no hay lands, the only grass found being around some of the lakes and along a few creeks. The soil on the ridges is mostly light and sandy. Most of the swamps can be easily drained and converted into good agricultural lands.

Across ranges 7, 8 and part of 9, the country is more rolling but contains many swamps. The soil is better and is covered with poplar, spruce, jackpine and brule. A stream, one hundred and twenty feet wide and three feet deep, crosses the line in section 35, range 8. Its valley is from one-half to three-quarters of a mile wide and seventy-five to one hundred and thirty feet deep. Some good clumps of spruce and poplar occur on the slopes of the valley. Several small creeks flow into this stream in the vicinity of the base line. Along most of these and also along the main stream good grass is to be found.

Across the remainder of range 9 and range 10, the country is high, rolling, and heavily timbered with poplar up to sixteen inches, spruce up to twenty-four inches and some birch and jackpine. The soil is good, consisting of black loam to a depth of six to ten inches on a subsoil of clay. Touchwood lake, which lies in townships 66 and 67, ranges 9 and 10, drains into Beaver river and Heart lake in townships 70, ranges 10 and 11, and ultimately to the Athabaska. Both lakes abound in whitefish.

The line in ranges 11 and 12 crosses rolling country, but the hills are lower than in the more easterly ranges, and there is considerably more swamp and muskeg. The timber is mostly poplar, spruce and birch up to eight inches. A wagon road from lac la Biche to Heart lake crosses in range 11, and on the west shore of Heart lake there is a small settlement of Indians and half-breeds. They grow potatoes and vegetables successfully and have a number of horses. The land in this vicinity is very lightly wooded and can be easily cleared.

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The country crossed by the twentieth base line is of much the same character across the nine ranges. The general slope is to the north and the surface is rolling, consisting of ridges covered with spruce, jackpine, poplar and a little birch, alternating with spruce and tamarack swamps. The timber seldom exceeds eight inches and nowhere is it of commercial value ; but there is everywhere sufficient for the needs of settlers. All the swamps can be easily drained and will make good agricultural lands. Little hay was found.

Buffalo river flows east across the line in range 1 ; there is a little grass along its banks. Winefred river crosses in range 3, flowing northeast from Winefred lake in townships 75 and 76, ranges 4 and 5. The banks of the stream are low and swampy. Winefred lake is said to abound with whitefish. There are a few Indians at the lake who grow a few potatoes that appear to do well.

The pack-trail from Heart lake to McMurray crosses the line in range 3.

A lake, about eleven miles long and averaging one and one-half miles wide, lies close to the line in townships 76, ranges 5, 6 and 7. Whitefish and jackfish are plentiful in this lake. The outlet is at the west end by a creek which flows to Pembina river, about six miles to the north. There is a number of old houses at the west end, but only one Indian, with his family, now lives there.

A small lake just north of the line in range 7 is surrounded by a narrow strip of good hay meadow.

APPENDIX No. 20.

ABSTRACT OF THE REPORT OF A. L. CUMMING, D.L.S.

SURVEYS AROUND BRULE LAKE, SOUTHWESTERN ALBERTA.

Leaving Edmonton on May 6, we went by the Grand Trunk Pacific railway to Wolf Creek, and from there by trail to the fourteenth base line, north of Brule lake. We crossed McLeod river at Wolf Creek and Athabaska river at Prairie Creek, both rivers being at high water.

After building two caches, one at Prairie Creek and another near our work, we commenced on June 1, the subdivision of township 52, range 26, west of the fifth meridian.

Subdivision work was also performed in townships 49, 50 and 51, range 25, and township 51, range 26, after which Athabaska river was traversed from township 50, range 27, west of the fifth meridian to township 47, range 1, west of the sixth meridian.

The part of the Athabaska traversed lies wholly within the Jasper Forest Park reserve. Township 47, range 1, west of the sixth meridian, is reached by the freight road along the Grand Trunk Pacific railway.

It is a first-class wagon road and heavy loads can be hauled over it. The Athabaska ferry crosses the river approximately in section 14, township 48, range 28, west of the fifth meridian, and from there the road follows the left bank of the river. The soil along the river is mostly a sandy loam with sand subsoil, but in places is rocky, the rock being a hard bluish limestone. The banks are not very high and are covered mostly with good spruce running from fifteen to twenty inches in diameter. Athabaska river is a large swift-running stream, varying in width from one hundred yards to almost a mile, where it expands into Jasper and Brule lakes. The river was not frozen over at the time of traverse in December, because the current is swift and the Chinook winds play havoc with the ice that forms. The ice was sufficiently formed along the banks to permit us to do most of the traverse on the river, and we were compelled to work on the shore only where points jutting out allowed no ice to form. The first expansion of the river going down stream is Jasper lake, which is about one mile wide and six miles long. A very large lake about five miles long runs almost parallel to Jasper lake on the right bank, being separated by only a narrow ridge of land. At the outlet of Jasper lake going down stream there is a beautiful archipelago containing islands of all sizes which are covered with good green spruce, and at high water the larger islands appear as a number of smaller ones, while a great number of gravel bars are to be seen at low water. The river runs through a very pretty valley varying from one to four miles in width. Again there are places where this valley is broken by the foot-hills rising at the edge of the river, and consequently narrowing the river very much at these points. Water-power might be developed by damming the river at those points, but very little could be done without seriously interfering with the Grand Trunk Pacific grade which is very close to high-water mark. The scenery in the park is magnificent, the snow-capped peaks of the Rocky mountains forming a striking contrast to the peaceful green valley of the Athabaska. Bullrush mountains and roche Snette on the left bank, and the Folding mountains, roche Miette and roche Jacques on the right bank within three miles of each other, appear to tower over the river.

Finishing the traverse on December 28, the party returned to Edmonton, arriving there on January 3, 1911.

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APPENDIX No. 21.

ABSTRACT OF THE REPORT OF W. J. DEANS, D.L.S.

SURVEYS IN THE RAILWAY BELT OF BRITISH COLUMBIA

I arrived at Notch Hill on May 3, 1910, whence I proceeded to township 22, range 10, west of the sixth meridian.

My first work consisted of the surveying of part of this township into half legal subdivisions. These lands extend to the shore of Blind Bay on Shuswap lake and vary in height from a few feet to 1,300 feet above the lake. Most of the land in the area subdivided is classed as bench land though in some places there are quite large level tracts, and in other places the land is broken by ridges and ravines. The soil generally on the flat land is clay, while on the broken land it is a clay mixed with sand and gravel. The whole surface, except where burnt over by fire, is covered with a thick growth of small poplar, birch and willow, with occasional clumps of fir which have been left by the lumbermen owing to the difficulties of getting the logs out. There are four small lakes containing good water. As all or most of the land surveyed by me was in a timber berth, there are numerous lumber roads and trails throughout the whole tract. There is, also, a good road from Notch Hill station, running through the township. These roads and trails make travelling easy and the market for produce can at all seasons be reached without difficulty. I am told by the settlers that the heavy clay land will not produce satisfactory crops until it has been sown with white clover; this seems to restore to the soil all the elements necessary for successful production. I saw a few small apple orchards, which had been planted on this clay soil prepared first by sowing clover, and, although the trees had only been set out two years, they were in a very healthy condition and gave promise of development into a producing orchard. I saw a five-acre apple orchard at Notch Hill station, the trees of which consisted of well-known winter varieties, and had been set out two years. The owner bought the land at fifty dollars an acre. He was well pleased with his venture, and felt sure that the climate and soil were well suited to apple production. This land is similar to the lands I subdivided, and I have no doubt that most of the land surveyed in this township is well adapted to the cultivation of apples, cherries and berries.

These lands are also well adapted to the production of garden vegetables. I saw many small gardens, and although the land did not seem to be in a high state of cultivation, yet the vegetables would be hard to excel.

Timothy yields well on the lower levels, and heavy crops of oats are grown.

The rainfall during May, June and part of July was sufficient for agricultural purposes, and although we had frosts in May and June, yet they were not severe enough to do any damage to grain or vegetables.

There are many ideal camping places in this township along the shores of Shuswap lake. A beach of sand and gravel extends fifty feet back from the water, and from there the land rises in a gradual slope. The ground is carpeted with a thick growth of grass and creeping vines and is wooded with large fir and cedar. Bears and deer are to be found in the forest, while the lake abounds in fish. Plenty of pure water is to be found in the numerous mountain streams. My last work in the township, which was finished on July 12, was near White lake. The land near the lake is covered with a heavy growth of fir and cedar, some of them thirty-six inches in diameter. Fire has done some damage around the lake and the fallen timber makes it difficult to travel.

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On July 13, I hired a gasoline launch and moved the outfit to township 24, range 8, west of the sixth meridian. This township is situated on the shores of Seymour Arm, a part of Shuswap lake. On July 15, I started to run the north boundaries of sections 3, 2 and 1, which form part of a reservation to the south. This line extends from the lake shore up the side of a steep mountain and attains a height of 2,200 feet above the lake. Then there is a flat of some twenty chains and then the line descends to the west shore of Anstey Arm. The surface of the mountain on the west side near the lake is covered with fir, poplar and cedar from ten to twelve inches in diameter, while farther up the mountain the trees are small and scattered, with clumps of poplar and hemlock scrub. On the top of the mountain, the timber consists of fir, hemlock, and birch, from eight to ten inches in diameter, with hemlock scrub. On the east slope of the mountain the timber is generally small, except in a few places where the fir and hemlock attain a diameter of from twelve to sixteen inches.

The soil along the north boundary of this reservation consists of sand and stones, with patches of rock. There are a few places where the soil is clay, but the area is very small. I do not consider the lands adjoining the north boundary of this reservation on either side of any value for agricultural purposes.

On July 19, we moved the outfit up Seymour Arm to the north boundary of section 15. My work here consisted in subdividing a strip of land lying between the north boundaries of sections 15 and 35 and extending back from the lake shore for a distance of about a mile and a half. The shore of the lake had been traversed and monuments erected at section corners. Generally speaking, the whole of this tract rises very abruptly from the lake to a height of 400 feet, then in short benches until a height of from 1,200 to 1,600 feet is attained at a distance of a mile from the lake shore. There is a large portion of this tract which in my opinion is suitable for the cultivation of apples, cherries and berries. Wild berries grow in great abundance, attain a great size and have a splendid flavour. The soil in this part is mostly clay, gravel and sand, with large patches of bare rock in many places. The surface near the lake is covered with fir, poplar, birch and cedar, from six to twenty-four inches in diameter. Most of the large fir which we cut down were rotten at the heart, while the cedar were only shells. The surface a mile back from the lake is largely covered with a thick growth of small hemlock with occasional clumps of fir. The soil where these small hemlock grow consists of loose rock, covered with moss and an inch or two of soil. I did not subdivide the east half of section 23 nor the west half of section 25, township 24, range 8. I do not think that these lands are of any use for agricultural purposes. The soil is largely composed of loose rock and moss on which there is a thick growth of small hemlock scrub.

I completed the subdivision of that portion of township 24, range 8, lying along Seymour Arm, and on August 23, moved the outfit by gasoline launch to Anstey Arm, camping on section 12. I subdivided the northeast quarter of section 12 and the east half of section 13, thus completing all the subdivisions which I had to make in township 24, range 8. The land in sections 12 and 13 slopes gradually up from the lake to a height of 400 to 800 feet. The surface is covered with a thick growth of poplar, fir and cedar, from three to six inches in diameter; there are numerous ravines in section 12, which cut the land up badly and the soil is clay with gravel and loose rock covered with moss along the north side of the section.

The east half of section 13 contains some good land which slopes towards Anstey Arm; the soil is clay and sand with gravel and patches of rock in places, and the surface is covered with a thick growth of small spruce and birch, with thick underbrush. To clear this land would entail a good deal of hard work, but it would amply repay the settler when under cultivation. I subdivided section 18 and part of 19 in township 24, range 7. These sections slope sharply towards Anstey Arm and are covered with a thick growth of bush, with scattered fir, cedar, poplar and birch, eight to ten inches in diameter. The soil is clay and gravel with patches of rock.

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On September 9, I moved the outfit with two small rowboats across Anstey Arm to section 8. My work in this locality was to subdivide the land lying along the shore of the arm between the north boundary of section 7, and the south boundaries of sections 5 and 6. I completed the subdivision of this tract on September 21, and moved camp to section 35, township 24, range 7. The work in the township was finished on October 15. Most of the land which I subdivided along Seymour and Anstey Arms is well adapted to apple and berry production. The soil is suitable, the rainfall sufficient, and I think there are no severe summer frosts. The land is accessible by boat, the greater part of the year. Sicamous Junction, a station on the Canadian Pacific railway, is within eighteen miles, and from this point a number of steamboats and gasoline launches make trips to different parts of the lake. Farm produce and vegetables are very high in price, the local demand at all times being much in excess of the supply.

On October 15, I moved into Sicamous on my way to the Columbia river valley. I arrived in Golden on October 16, where I moved the outfit by train to section 3, township 26, range 21, west of the fifth meridian.

Golden, situated on the main line of the Canadian Pacific railway near the junction of the Kicking Horse and Columbia rivers, contains about 800 inhabitants. It is an important railway point, and it is also the headquarters of a large lumbering company. There are a number of churches in Golden and also a good school. The town is lighted by electricity and has an efficient fire brigade. The lands in the vicinity are fertile and when settled and cultivated Golden will become a thriving centre. There is a steamboat which sails from Golden to the head waters of the Columbia river and does a large trade in passengers and freight. There is also a good wagon road, running south in the Columbia river valley to Fort Steele. The Kootenay Central railway have a portion of their road constructed.

My work in the Columbia river valley was to survey three timber berths and subdivide agricultural lands in townships 25 and 26, range 21, west of the fifth meridian. I had a great deal of trouble and hard work to get my outfit up to the northeast corner of section 4, as this point is about 800 feet above the Kootenay road. I surveyed timber berth No. 542 from this camp and ran all lines within a reasonable distance. On November 17 I divided my outfit, leaving half camped on section 26, township 25, range 21, while the other half went up to survey timber berth No. 541 and camped near the east boundary of section 36, and as this land is fairly good for agricultural purposes I laid it out in legal subdivisions. The timber will probably be cut off inside of two years, when the land will be available for settlement. The Columbia River Lumber company have about sixty men working on timber limit No. 421 and expect to cut not less than 3,000,000 feet. The same company have also a camp on section 10, township 26, range 21, and expect to cut 2,000,000 feet. On both these limits they are cutting some fine timber, principally fir and spruce. These camps furnish employment for a large number of men in winter. Few of the settlers appear to take advantage of this opportunity to get employment, as nearly all the men are from outside points, and when the camps break up in the spring, they seek new fields of employment. I did not subdivide the northwest quarter of section 26, as this land is subject to flood and is at the present time largely covered with water, the only portion dry being a small fringe along the banks of Columbia river. I had considerable difficulty in surveying timber berth No. 543 on account of the river not being frozen very hard it being necessary for us to cross and recross it a number of times. This timber berth lies on the west side of Columbia river and consists of fractional southwest quarter of section 26, township 25, range 21. The berth is level, except at the southwest corner, where it rises to a height of about 300 feet. The soil is clay and sand, and will produce hay, grain, vegetables and fruit. There is an extensive strip of flat land on both sides of Columbia river, but owing to the river overflowing its banks, this land is covered with water the greater part of the year, and, therefore, not of much value even for grazing

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purposes. To make this land available for settlement involves engineering difficulties, the solution of which is of the greatest importance to the settlers. Owing to the depth of snow on the benches and the stormy weather, I was unable to complete all of the work in townships 25 and 26, range 21, for which I had instructions.

Before discontinuing the work I ran the north and east boundaries of section 30, township 26, range 21.

The settlement in the Columbia river valley is confined to a narrow strip along the Kootenay road, so that between the settled lands and the mountains there is quite an extensive bench of agricultural land. These bench lands are from 100 to 1,000 feet above Columbia river and contain many small tracts of level land. The soil is clay, sand and gravel, with patches of rock, and the surface is covered with fir, spruce, poplar and birch. In most places the merchantable timber has been cut off, yet in many places there are quite large clumps of fir twelve to eighteen inches in diameter which were too scattered for lumbermen to log economically. There are numerous trails and roads through these lands, made by the lumbermen, and in some places the land could be cleared with little labour.

This part of British Columbia has many inducements to offer the settler. The summers are delightful, being warm in the daytime and cool at night, while the winters are mild. Good prices can be obtained for all kinds of farm produce. The soil is fertile, and there is plenty of timber for building purposes and fuel. An abundant supply of pure water suitable for all domestic purposes can be easily obtained. Roads are good, while schools and churches are within reach of all. Plenty of wild game is found in the forest and fish in the rivers and streams.

The weather for the greater part of the season was favourable for field work. We had two weeks of rainy weather in October, and some rainy and stormy weather in November and December.

I discontinued the work on December 15, and on the same day moved into Golden, paid the men off, and on December 19 arrived back in Brandon.

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APPENDIX No. 22.

ABSTRACT OF THE REPORT OF W. A. DUCKER, D.L.S.

SURVEY OF THE OUTLINES OF THE PORCUPINE FOREST RESERVE.

My first work was the survey of the east boundary of township 40, range 28, west of the principal meridian, starting from my base line of last winter. I then ran the east boundaries of townships 40 and 39, range 29, and having produced the east boundary of township 38, range 29, from the northeast corner of section 24 to the correction line, I ran the jog and fixed the corners on the correction line in accordance with the instructions of the Manual of Survey.

From this point I had to cut a road to Caverly's mills in township 38, range 28, a distance of about five miles, and from this mill there is a good winter trail to Bowman from which point our supplies were secured.

I then ran the east boundaries of townships 40 and 39, range 30, from my base line of last year, running the jog and fixing the posts on the correction line in accordance with the instructions of the Manual. This latter meridian is the boundary between Manitoba and Saskatchewan.

I next ran the north side of the tenth correction line across ranges 30, 31 and fractional range 32 to the second meridian giving all quarter sections their theoretic width of forty chains and sixteen links.

At this time the snow was rapidly disappearing, and I took the party into Bowman, which was reached on April 3, and to Winnipeg the following day, where the party was disbanded.

The general character of this forest reserve was pretty fully described in my report of last winter's operations. Most of the old timber was fire-killed some years ago and now lies in a tangle. The fires did not run through the swamps and the muskegs but nearly all the humus soil on the ridges was destroyed and most of the sandy clay sub-soil is pretty stony. The greater portion of the surface is covered with a thick growth of young timber, largely jackpine, though in the southern portion of the reserve there is more spruce and other timber which would be of value than in the central portion where I worked last year.

The snowfall of the past winter was exceptionally heavy, being thirty inches to three feet deep on the level, and with the windfall and undergrowth made any rapid progress impossible.

There are many fine lakes of considerable size throughout this reserve and in most of them the water is of a good quality and fish of various kinds are said to be plentiful. It is also a great summer range and breeding ground for moose, the barked trees on which they polish their horns being visible in all directions, but in winter time they move to the lower ground, and I think that only two were seen in the reserve by my party during the progress of the work.

The past two winters have been poor years for rabbits, and in consequence fur is very scarce and tracks of fur-bearing animals were very rarely seen.

There are some beaver in the reserve and a colony have a dam and a large house on section 6, township 39, range 30. A number of muskrat houses were also seen, though these animals are becoming very scarce owing to the high price of the fur for the past few years.

Owing to the large amount of fallen and decayed timber and the inflammable nature of the young growing conifers, great care will be necessary for several years to keep fire out of this reserve.

One fire crossed the south boundary last spring near Jackfish creek in range 32 at the time when the poplar were in bud, but apparently did not do much damage as it was a surface fire running in the dead leaves and grass; I do not think it ran far, but it killed the young poplar as far as it went.

APPENDIX No. 23.

REPORT OF CARL ENGLER, D.L.S.

MISCELLANEOUS SURVEYS IN NORTHERN ALBERTA.

OTTAWA, Jan. 24, 1911

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following general report on the survey of the northern boundary of the Province of Alberta across Slave river.

On May 5, 1910, I left Ottawa arriving at Edmonton on May 10 where I was joined by my assistant Mr. J. A. Cote. We set out next morning for Athabaska Landing arriving there on May 13 in the evening.

The flotilla of scows employed by the Hudson's Bay company was to leave Athabaska Landing en route for the north on May 15, but owing to delays in procuring men to manage the scows and to a reluctance on the part of those in charge to leave when the water was low, the departure did not take place till the evening of May 21. We were finally compelled to start with fewer men than usual and in low water, conditions which delayed the progress of the expedition wherever rapids existed in the river. On account of the low water many spots were dangerous which under high water could be run with comparative safety, and owing to the scarcity of men it was necessary to tie up half the scows above such bad spots while the crew "doubled up" on the remaining boats, ran them down to where the river was safe and then came back for the rest.

These delays were slight however compared to those of portages. The first portage is at Grand rapids, the most formidable obstacle to navigation on the river, which was reached May 28 about noon. The river here is divided into two channels by an island. In going down stream boats usually land their cargoes at the upper end of this island, haul the cargoes to the lower end by means of hand-cars running on a rude tramway, run the boats down empty through the eastern channel (the smaller one) and reload them at the foot of the island. As the water was very low when we arrived it was necessary to run the boats for the last two or three miles above the rapids with half loads, each boat making two trips. It was not until the afternoon of June 3 that we were ready to embark below and proceed on our journey.

The river from Grand rapids to McMurray has many rapids. In fact to one inexperienced it seems to be all rapids. The total distance is said to be ninety miles, and I have been told that it can be run in high water in ten hours. When the water is low the "big cascades" necessitate the lightening of boats by making a short portage of about half their loads. On our trip this involved a delay of about a day. We arrived at McMurray on the evening of June 8.

Here we had another delay of about a week waiting for the steamer *Grahme*. The trip by the *Grahme* promised less delay, but when we got to Chipewyan we were compelled to wait three days for calmer weather, it being considered unsafe for the boat to go out in the lake when it was at all rough. After a further delay of about a day on Slave river in a vain attempt to right the Hudson's Bay company's stranded steamer *Primrose* we arrived at Smith landing June 22.

I have dwelt in detail on the time consumed in this trip (thirty-eight days from the time boats were to leave Athabaska Landing) so that another surveyor going into

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the country may know what to expect. The Hudson's Bay company are in the country primarily to trade in furs, their transportation business for the public being an incidental. They plan to make a certain number of trips in a season and insist rather on doing things with care and safety than on an exact time schedule. Consequently most of the other fur traders and others going into the country do so by getting a scow of their own and employing a skilled pilot and crew. I have been informed by men who have gone into the country in this manner that they have made the trip to McKay which is about thirty-five miles below McMurray in three days and to Fort Resolution in eight days. In the latter case a steamer was used below Fort Smith. While I do not doubt the exceptional character of these rates of travel there is no doubt that a great saving of time is effected.

Upon arriving at Smith landing I received a letter left for me by the Honourable Frank Oliver, Minister of the Interior, asking me to undertake the survey of the settlement should time permit. I therefore spent about two weeks at this work and then went to Fort Smith, a distance of sixteen miles, and began a series of zenith telescope observations to determine the latitude, after which an offset southerly to the boundary of Alberta (the sixtieth parallel) and an east and west line across Slave river completed the work. On either side of the river a monument was placed to mark the boundary.

Whenever possible during the progress of the work at Fort Smith hourly readings of the declination of the magnetic needle were taken. In addition to this at every stopping place on the trip from Athabaska Landing observations were taken for magnetic declination, dip and total force as well as observations for time with a view of obtaining approximate longitudes.

The return trip was begun August 2 when we crossed to Smith landing whence the steamer *Grahme* departed August 5, arriving at McMurray, August 9. The most difficult part of the trip from McMurray to Athabaska Landing took from August 12 to September 4. Six scows laden with furs of the Hudson's Bay company and other traders, the personal effects of the passengers, and food and cooking utensils for all, were hauled up stream against the swift current at a rate varying from four to twenty-five miles per day by a crew of about eight men to each boat. Portages were made at "big cascades" and at Grand rapids. Almost everyone who comes into the country goes out of it by this transport, at least so it seemed this season, as there were about sixty passengers. To anyone coming out independently I should think a large Peterborough canoe would have a great advantage it being so light that the trackers could make better progress.

A word as to the natural resources of the country may not be out of place. As regards timber, broadly speaking the whole river-valley is well wooded, all low river flats and islands bearing good spruce for commercial purposes. At McMurray I measured a spruce ten feet four inches in circumference, and at many stopping places saw trees thirty inches in diameter. Many of the higher flats are covered with poplar of quite uniform size and as large as two feet in diameter. What lies outside of the river-valley I cannot say. Enormous cliffs of tar sand are seen from McMurray to McKay. The quantities of this sand are so great and some of it bears such a large proportion of tar that one would naturally expect to find pure tar or coal, gas, or oil in the vicinity. While several borings have been made for oil none are deep enough to be conclusive in their evidence. At Grand rapids a seam of coal shale was burning when we passed, and at Pelican river from a boring originally made for oil a gas flame from fifteen to twenty-five feet high shot up, the force of the natural gas making a noise like the roar of a waterfall, which could be heard several miles.

As to the agricultural possibilities of the country I should speak with caution as I was there in the warm season only. I was surprised at the rapidity and perfection of the growth of the garden produce, such as potatoes, radishes, lettuce, carrots and onions. At Fort Smith on the last day of July oats were headed out with a slight

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suggestion of the yellow of ripening, and barley was almost ripe; in fact the barley was so far advanced that if cut it would probably ripen in the shock. Potatoes were out in bloom. Unless this season is an exceptional one, I should say that it would be possible with a good market to carry on mixed farming, though I do not consider it advisable to attempt it while land with better climatic conditions is available. At Calling river on September 2 I saw a small field of wheat which was well ripened and as nearly as I could tell had not been damaged by frost. The owner said he had grown wheat successfully for several years. This is the farthest north that I saw wheat growing.

I have the honour to be, Sir,

Your obedient servant.

CARL ENGLER, D.L.S.

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APPENDIX No. 24.

ABSTRACT OF THE REPORT OF L. É. FONTAINE, D.L.S

MISCELLANEOUS SURVEYS AND INSPECTION OF SURVEYS MADE UNDER CONTRACT IN THE
EDMONTON DISTRICT.

On February 7, 1910, I reached Ottawa and having received my final instructions I left after a day's delay for Saskatoon to inspect the new stock of iron posts supplied to the Department to be used by surveyors in marking section and quarter section corners.

I then proceeded to Edmonton, where I arrived on February 17. Having completed my organization I left on March 1 for Entwistle to perform some miscellaneous surveys in township 55, range 7 and township 54, range 8, west of the fifth meridian.

Having completed this work on April 20, we proceeded westerly and from Chip lake as a base inspected the surveys performed under contract No. 10 of 1909, and made a retracement of part of township 54, range 12, west of the fifth meridian.

On May 26, I returned to Entwistle, and for the remainder of the season was engaged upon the following surveys in the order named: the examination of the addition to contract No. 18 of 1908, contract No. 25 of 1908, contracts Nos. 16, 23, 9, 22 and 25 of 1909, the reexamination of contract No. 12 of 1908 and some check measurements and necessary traverses in this last contract.

The principal drawbacks of the season were the poor roads in some localities and the absence of fords on the streams. However, the country is rapidly becoming accessible on account of the extensive railway construction being carried on and settlement is progressing satisfactorily.

Separate reports have been submitted on the condition of the surveys in each contract inspected.

APPENDIX No. 25.

ABSTRACT OF THE REPORT OF J. FRANCIS, D.L.S.

SURVEYS IN SOUTHWESTERN ALBERTA.

I left Edmonton on May 10 and reached "The Leavings" on McLeod river on the 14th. I remained there till the 20th, as I was compelled to send back to "big eddy" for supplies, feed for the horses being very scarce. I reached township 48, range 24, west of the fifth meridian on May 27.

On section 31 of this township the west fork of the McLeod divides into two streams of about equal volume, both coming from the rocky hills, one from the south, and the other from the southwest.

Both branches were explored for the surveyed coal claims which were found on the south fork about five miles from the confluence. No coal, however, was seen on the surface in this district. The valleys contain some timber fit for ties and sawlogs. The hills have been burnt over, but are now reforesting with pine and spruce. On June 15 we proceeded to our next work which was situated in the west half of township 49, range 23. This tract is traversed from north to south by McLeod river, the valley of which with its slopes contains some fairly large timber, consisting of pine and spruce, fit for sawlogs and railroad ties. One seam of coal was noticed on the northwest quarter of section 17, and a claim to this had been roughly marked on the ground.

Our next move was to townships 45, ranges 20 and 21. We went by a pack-trail made by A. H. Hawkins, D.L.S., up McLeod river, over some burnt hills, crossing the head waters of the Pembina and down a branch of Southesk river.

Our work in this district was crossed from east to west by Southesk river, which receives several tributaries, mostly from the south side. A range of high hills, rising about 1,400 feet above the river, commences in section 10, township 45, range 21, and extends northwesterly through this township and into the next range. The south slope of this range of hills is covered with a thick growth of pine and spruce, generally small, but having trees large enough to furnish a considerable number of railroad ties. The north slope is not so well timbered, having more spruce and balsam than pine. On sections 13 and 14, there are some open places, being mostly hillside muskegs, wet and of no use agriculturally. Numerous prospects or coal exposures were noticed along the banks of Southesk river. These coal seams were not thick, being generally in an almost vertical position, and were apparently broken from the parent bed. Development work would be required to ascertain if these seams contained sufficient quantities of coal to warrant the expense of roads. The valley of the Southesk through range 21 is only from five to ten chains wide, with successive benches extending on each side, finally merging into the high hilltops. The current of the river is swift and there are many rapids. The river is about sixty feet wide with a normal depth of eighteen inches, and in some places passes through canyons where water-power could be easily developed. During the months of August and September several snowstorms were encountered in this district, which I think is something unusual for this region.

We ran short of provisions after surveying twelve miles in township 44, range 21, as it had now become difficult to get them brought in on account of bad trails, and on October 2 we left this district for Prairie Creek, where we arrived on October 6. I procured supplies enough from the railroad contractors and roadside stores to survey part of township 50, range 25. This portion consists of burnt hills and intervening

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valleys, both having a general slope northwesterly to the valley of Prairie creek. The forest fires which have passed over this part seem to have rendered the soil almost useless even for the production of grass or the speedy reforestation of the surface. On Cold creek, a tributary of Prairie creek, coal was observed, claims having been already surveyed. The different tracts surveyed this year are of very little use for agricultural purposes, the altitude being too great to mature any grain crops. Vegetables, however, could no doubt be grown in many of the valleys. As these tracts were all more or less timbered, having few open places, there was no hay, and very little pasture. No part could be recommended for ranching or settlement. The timber growing on these lands will furnish ties, culvert and bridge timber for railroads into the coal fields, and an inexhaustible supply of mining props for the mines. With the exception of township 50, range 25, the country surveyed, wherever overran by fire in the past, is now covered with a thick growth of young pine growing up through the underlying windfall. This should be preserved as far as possible so as to insure rainfall and moisture.

On finishing our work at Prairie Creek on October 26, we started on our return journey to Edmonton, where we arrived on November 1.

APPENDIX No. 26.

ABSTRACT OF THE REPORT OF A. H. HAWKINS, D.L.S.

SURVEY OF PART OF THE TWENTY-FIRST BASE LINE, WEST OF THE FIFTH MERIDIAN AND MISCELLANEOUS SURVEYS IN ALBERTA AND SASKATCHEWAN.

After a few days spent in organizing the party, I left Edmonton in March and proceeded by way of Athabaska Landing and the north shores of Athabaska and Little Slave rivers and Lesser Slave lake to Grouard, and thence by wagon road to our starting-point, the northeast corner of township 80, range 19. The best way to enter this country, however, is to wait until navigation opens and then Grouard may be reached by boat from Athabaska Landing. From Grouard fairly good roads lead west and north through the best districts. Along the road followed from Grouard to the base line, squatters or homesteaders are settled on almost every patch of open land. The tilled fields, haystacks, cattle, horses, chickens and hogs all in good condition, bear evidence of the productiveness of the land in this district.

The production of the base line eastward was commenced on April 25 and completed to the fifth meridian by the end of August; only two or three days were lost on account of rain throughout the season.

The alluvial soil throughout the district is a clay or sandy loam with a subsoil varying from clay to sand and gravel and appears very fertile. At Whitefish Lake and Wabiskaw there are excellent gardens, and the whole district is covered with a rank growth of grass and underbrush. The timber is light and can be cleared away with little difficulty.

The surface is timbered with poplar, spruce, balsam of Gilead and balsam on the ridges and with spruce, tamarack, balsam of Gilead and black alder in the low lands. The timber has no commercial value, but will supply the needs of settlers for many years for buildings, fences and fuel.

It is reported that a bush of spruce timber, about five miles by four, exists about six miles north of the line. The timber here is said to be from six to thirty inches in diameter tall and clean.

From range 19 to range 9 about sixty per cent of the land is fit for agricultural purposes, east of range 9, where it is more level and where swamps and muskegs occur between forty and fifty per cent is fit for settlement. However, a large proportion of the muskegs and marshes can be easily drained.

Hay is abundant throughout the district. It is difficult to specify the hay lands where they are so numerous, but particular mention might be made of Atekamic river along whose banks thousands of tons of hay could be put up from the excellent tracts between the base line and Atekamic lake. The same is true of the lands along Pastecho river and Atekamic lake, and a large marshy lake in sections 31 and 32, township 80, range 16.

Fresh water is abundant: the North and South Heart rivers with their tributaries supply ranges 18 and 12; Atekamic lake and river supply ranges 12 to 8, while ranges east of this are supplied by Nepesekopon and Pastecho rivers. Serious flooding is not likely to occur along any of these streams except perhaps Pastecho river whose valley is very wide.

Numerous rapids are reported to exist seven or eight miles down Atekamic river from which it may be possible to develop power.

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The climate is about the same as that of Edmonton. The nights are cool and summer frosts are frequent, but usually so light that vegetation is not injured. No doubt with the advance of settlement these frosts will no longer occur. During the spring and summer months there are long hours of sunshine, and vegetation matures rapidly. The snowfall is moderate and rain is not excessive.

No lignite nor coal was noticed, but petroleum is reported to have been found on Pelican river to the east and on Loon river to the north.

Moose and caribou are said to be numerous; bears are plentiful and water-fowl of all kinds are to be seen on the lakes, open marshes and rivers. Spruce and willow-partridges, and fool-hens are numerous. A few rabbits were noticed. Lynx, foxes and wolves were very scarce, but muskrats were plentiful. The beaver, apparently, is extinct, though signs of its past activity, such as old cuttings and dams are to be seen on every hand; not once during the season did we see a fresh indication of the animal's work. Pike and jackfish are to be found in the large streams, and these, with the abundance of whitefish in the lakes, provide food for the Indians and their dogs.

Two settlements were passed during the trip, viz: Whitefish Lake and Wabiskaw. Whitefish Lake settlement is situated on the east shore of Atekamisis lake. Here are trading posts of Messrs. Revillon Bros. and the Hudson's Bay company, and an Anglican mission school and church. A very fair wagon road leads to Grouard which can be reached in two days.

Wabiskaw is situated on the southerly end of the most northerly of the Wabiskaw lakes. Here also are stores and trading posts of Messrs. Revillon Bros. and the Hudson's Bay company and an Anglican mission school and church. Three or four miles south is a Roman Catholic mission school and church. Wabiskaw is in a rather isolated location; in summer it is most easily reached by water from Pelican rapids on the Athabaska, but there are several portages. In winter a sleigh trail leads across the Pelican mountains from a point on the Athabaska about forty miles northwest of Athabaska Landing.

Upon our return to Edmonton, I reengaged the party, and in a few days proceeded to township 52, range 1, west of the fifth meridian to traverse a lake in section 30. There are several fine sandy beaches around the lake, and the land on the southeast has been subdivided into lots. It is a very beautiful place for a summer resort.

For the remainder of the season we were occupied on the following miscellaneous surveys: traverses in township 47, range 1, west of fifth meridian, township 53, range 25 and township 58, range 11, west of the fourth meridian; investigation of survey monuments in township 48, range 22, and in township 45, range 4, west of the fourth meridian, and in township 53, range 25, west of the third meridian; retrace-ment in township 51, range 27, west of the fourth meridian, and in townships 29, ranges 31 and 32, west of the principal meridian.

APPENDIX No. 27.

ABSTRACT OF THE REPORT OF E. W. HUBBELL, D.L.S.

RESURVEYS AND INSPECTION OF CONTRACTS IN MANITOBA AND SASKATCHEWAN.

My first work was traversing a small lake in township 42, range 10, west of the second meridian. From there we cut a trail to township 42, range 9, and began the inspection of contract No. 13 of 1909, completing this work on April 28.

The soil throughout this contract is in general black loam with clay subsoil, suitable for the production of wheat, oats and vegetables. The surface is level and is covered with willow and second-growth poplar, with considerable windfall, but we did not notice any tracts of large timber. There are numerous muskegs and swamps interspersed throughout these townships in which plenty of good water is found; there are also a number of fine creeks. Red Deer river flows easterly across the northern part of township 48, range 7, and a wagon trail has been cut out to this river for nine miles by the lumbermen at Prairie River. We did not perceive any indications of lignite, coal or minerals.

Game is apparently not plentiful as we saw only a few moose. The Canadian Northern railway is about eight miles to the north and situated thereon is Prairie River, a small lumbering village and the nearest express and post-office.

Along our trail from Nut lake to these townships, there are numerous open spaces which seemed to me very desirable for homesteading, every requirement of the settler being obtainable.

From there we proceeded to contract No. 17 of 1909, which comprises townships 44, ranges 2, 3, 4 and 5 and a portion of township 43, range 5, west of the second meridian. We had to cut a trail nearly all the way, but took advantage of the open muskegs which on May 3 were still frozen sufficiently strong to carry wagons. We passed through level country, rolling in places, and thickly covered with poplar and spruce varying in size from six to forty inches in diameter, with willow, hazel, alder, dense underbrush and immense tracts of large windfall. A great portion of this timber is well adapted for lumbering purposes, but until this has been cut the country is of little value for settlement. The soil throughout the townships of this contract is in general sandy clay and black loam with clay subsoil. A large portion would be suitable for the production of wheat, barley, oats, flax and vegetables. There are many small swamps and muskegs interspersed, from which there is always an ample supply of fairly good water.

In addition to Red Deer river, averaging about three chains in width which passes through several of these townships, there are many fine creeks, besides Eto-mami river, which is nearly as large as the Red Deer. Both these rivers are utilized by the various lumbering industries in this district to convey millions of logs to their sawmills, situated along the Canadian Northern railway. We saw no indications of coal, lignite veins or minerals. Owing to the low water the sawmills had to discontinue work early in the spring, an unusual occurrence for this section of the country. On May 9 we moved into Greenbush, a small lumbering town on the Canadian Northern railway.

There are no trails in this vicinity owing to the continuous muskegs along the railway track, and on this account we had to move our outfit thirteen miles by rail from Greenbush to Hudson Bay Junction, a small town of about 200 inhabitants. From there we went to further inspect contract No. 17, completing this work on May

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19. We then moved into township 45, range 3, a portion of contract No. 4 of 1910, which we examined.

This township is thickly covered with poplar, spruce, tamarack and willow, with many muskegs interspersed. A branch line of the Canadian Northern railway passes through this township, starting from Hudson Bay Junction and terminating at The Pas, about ninety miles distant. All the material for the construction of an immense iron railway bridge across Saskatchewan river at The Pas is freighted on this line.

On May 23 we moved to Tisdale, where we arrived the following day. We traversed a lake in township 42, range 13, upon completion of which we went by trail to Kinistino, a distance of about one hundred miles. I have already reported on this part of the country. However, I may add that settlement seems on the increase in every direction in this very fertile section, which I have previously termed 'The Garden of the Prince Albert district.' On June 2 we moved into township 48, range 21, west of the second meridian and commenced the resurvey of this township the following day.

Access to this township is easily obtained by various routes. A surveyed trail passes through it from Prince Albert to Fort à la Corne, and there is also a fine graded road to Kinistino, a thriving little town on the Canadian Northern railway, about fifteen miles distant. The soil of the southern two-thirds of this township in general is black loam with clay subsoil, while the northern third is sandy and practically unfit for cultivation, although all kinds of grain and vegetables are produced in the southern portion.

The surface throughout is rolling, about sixty per cent being covered with poplar, tamarack, jackpine, willow and various clumps of spruce.

In the northern part of the township considerable jackpine and some spruce is available for manufacturing purposes. There are numerous hay marshes scattered throughout, which supply sufficient good hay for the settlers in this vicinity. Good fresh water is found in Saskatchewan river, in fairly large lakes in sections 1 and 19, and in many smaller lakes and ponds. The water in these lakes is permanent, and the land is not subject to flooding. We were informed by the settlers that the climate is most desirable, there being no summer frosts of any account. Great quantities of jackpine and poplar furnish unlimited fire-wood. We did not notice any indications of coal, lignite veins, stone for quarrying, or minerals.

There are a few moose and jumping deer in this vicinity. Ducks are numerous and a few prairie-chickens and partridges were seen. All the agricultural land in this township is settled on. This section of the country is ideal for mixed farming, and as such is taken advantage of. In connection with our work we traversed several lakes and a portion of Saskatchewan river, connecting our lines, when possible, with monuments on surveyed trails.

Our next work was the resurvey of township 49, range 27, west of the second meridian, which is north of the Saskatchewan and about six miles northwest of the city of Prince Albert. We commenced the work of subdivision July 6 and finished August 9.

This township is very easy of access, there being two well-travelled surveyed trails passing through it. The one about the centre runs to Shellbrook, Mont Nebo, and thence to Green Lake. The other trail farther north leads to Sturgeon lake. About seventy-five per cent of the soil of this township is very light and sandy and is unfit for agricultural purposes, but at the south and north there is about one and one-half tiers of sections in which the soil is principally black loam of varying thickness. Nearly all, if not all, the sections suitable for homesteading are filed on. There is no scarcity of water, as Saskatchewan river flows through the south part and Shell river, about a chain wide, meanders diagonally across the township entering the Saskatchewan in section 3. In the northeast corner there are numerous sloughs and muskegs containing very good water, the supply being permanent.

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The Prince Albert Lumber company send a large number of logs from Sturgeon lake district down Shell river, thence down the Saskatchewan to their mill at Prince Albert. In the spring Shell river is from eight to twelve feet in depth with a current of four miles per hour, and, while there are no natural falls or rapids where power might be developed, still, with some outlay, a dam might be constructed which would develop the necessary head of water for power, as the banks are high in places and comparatively close together.

Indian Reserve No. 94A consists of sections 32, 33, 34 and 35 of this township. The Canadian Northern railway, which has been extended from Prince Albert through Shellbrook, passes through this township and crosses Shell river on a high wooden trestle bridge. The extension of this line is invaluable to the settlers between Prince Albert and Battleford and opens a vast tract of excellent country for settlement.

Our next work necessitated a journey of 150 miles by trail to the Lost River country, where we arrived on August 18. During this trip we passed through some beautiful fertile country via Fort a la Corne, an old Hudson's Bay trading post. There are but few settlers along this route, a considerable portion of the country not being well adapted for settlement. However, in the Lost River country a great change has taken place in the past year; houses have sprung up in every direction and a fair quantity of land is under cultivation. This is an ideal country for mixed farming, there being plenty of hay, pea-vine, water, fuel in abundance, rich black loam and timber of all dimensions. One of the finest gardens I have ever seen in the west I saw here in township 50, range 14. The cabbages, cauliflowers, carrots, potatoes, cucumbers, tomatoes and corn were exceptionally large and fine. The climate is all that could be desired and game of all varieties is plentiful, particularly moose. The country is easy of access by good trails. Several new post-offices have been opened during the past year, and the nearest railway towns, Star City and Tisdale, on the Canadian Northern railway, are about fifty miles distant.

After completing our work here we left for Sprague, Manitoba, 550 miles distant, where we arrived on August 28. We commenced our work of inspection in township 1, range 15, east of the principal meridian, a part of contract No. 32 of 1907, after which we inspected contract No. 19 of 1909.

Nearly the whole country, with the exception of occasional sand ridges, is either a tamarack swamp, bog, or open floating muskeg, over which no horse could possibly travel, and at certain periods of the year not even a man could cross them. The surface of these muskegs consists of tangled matted grass and moss held together by fibrous roots, while underneath is muck, water and quicksand, varying in depth from two to ten feet.

The greater part of this district is swamp and muskeg, only a small percentage of which can ever be reclaimed by drainage, there being little difference between its altitude and that of Lake of the Woods. There are very few settlers and little land suitable for agricultural purposes, except about two hundred or three hundred acres around Moose lake. This lake, which teems with jackfish, is a fine body of clear water about three miles long and a mile and a half wide, and is surrounded by high banks covered with poplar, birch, spruce, cedar and willow. There are no trails except the Dawson road, which passes through the centre of these contracts from St. Anne to the Northwest Angle and is impassable during the greater part of the year. The soil in these townships, except along Reed river, around Moose lake and on a few ridges that are scattered throughout, is generally moss and vegetable muck. The surface might be classed as level and except on the open muskegs is covered with spruce, tamarack, cedar, ash, oak, poplar, willow and some jackpine, with a little birch along the watercourses and borders of lakes. The timber is of fair dimensions, varying from three to twenty inches in diameter, and is suitable for lumbering purposes, railway ties and fencing. The water is fresh and the supply adequate. Lake of the Woods, Whitemouth lake, Moose lake and Reed river receive a large supply of water from the

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extensive marshes and muskegs in the vicinity. Except for a few miles along the banks of Reed river, very little hay is to be had. This river rises in township 2, range 15, and flows northeasterly into Lake of the Woods. It varies in depth from one to ten feet, and its average width is about one chain, although it is much wider towards its mouth. Fire-wood in large quantities is easily obtained, and lumbering is carried on extensively by the Sprague Lumber company who own limits in this district and ship by rail to Winnipeg. Moose, bears and porcupines are numerous, while partridges and prairie-chickens are very plentiful. The Canadian Northern railway has a branch from its main line about ten miles east of Sprague, which extends a mile into township 1, range 16. Sprague is the nearest express, telegraph and post-office, also the last railway station on the Canadian side.

Our next work was the inspection of contract No. 5, of 1910, comprising townships in the vicinity of Mont Nebo and Indian reserves Nos. 104 and 118, west of the second meridian, about seventy-five miles northwest of Prince Albert. We entered this contract from the south by a good trail which is surveyed from Prince Albert to Green Lake, passing through Shellbrook and Mont Nebo, the former being the nearest telegraph and express office to this work. There are numerous trails in this vicinity radiating in every direction, this being a flourishing lumber district and comparatively well settled.

The soil in general throughout the townships comprising this contract is alluvial black loam varying from six to ten inches in depth, with clay and sandy subsoil, suitable for the production of wheat, oats, vegetables, etc. The surface in general is rolling, mostly covered with tamarack, jackpine, poplar, willow and considerable spruce of fair dimensions, well adapted for lumbering purposes. There are large patches of "park land" with small scattered bluffs of poplar and willow making ideal homesteading. Township 53, range 7 is mostly covered with poplar three to nine inches in diameter interspersed with a network of lakes and marshes. Hay is not very plentiful in this vicinity, but great quantities can be easily obtained from the swamps and marshes to the west. Shell river meanders through several of these townships, and at the time of inspection was from two to four feet deep. The volume of water is not sufficient for the development of power. The climate is agreeable and not subject to sudden changes of temperature. Great quantities of fire-wood can be readily obtained in these townships. We observed no indications of coal, lignite veins, minerals, nor stone in sufficient quantities for quarrying. Moose, elk and jumping deer are frequently seen, while prairie-chickens, partridges and ducks are very plentiful.

The Canadian Northern railway has a branch line from Shellbrook which passes through the eastern portion of this contract to Ladder lake, where the Big River lumber camp is situated on Cowan lake.

We finished the inspection of this contract on November 7 and moved camp to Witchehan lake, a large sheet of water in townships 51 and 52, range 11, west of the third meridian, and commenced the inspection of contract No. 6 of 1910, comprising townships 50 and 51, ranges 12 and 13, west of the third meridian, finishing it on November 17.

These townships are pretty heavily wooded with poplar, willow, some spruce and jackpine and contain numerous small lakes of fresh water. A trail crosses Big river in township 53, range 11, passes through this contract and joins the main trail from Battleford at Glenbush post-office in township 49, range 14. There are no settlers, although there are some excellent quarter sections admirably adapted for settlement. The surface is rolling and the soil sandy loam. From here we moved into township 53, range 15, a portion of contract No. 7 of 1910, and commenced the inspection of this work, finishing it on November 28. The townships comprising this contract are thickly covered with poplar, willow, spruce, tamarack and heavy windfall. The soil is black loam and sand, and the surface is generally rolling. These townships are

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too heavily wooded for settlement, there being but little, if any, open country. Long lake in townships 52 and 53, range 15, is a beautiful sheet of fresh water about ten miles long and from three-quarters to one mile in width, with sandy shores and good banks surrounded at the southern end by marshes of very good hay. Great quantities of fire-wood can be readily obtained in these townships. Moose, jumping deer, bears and timber-wolves were seen occasionally, and also great numbers of partridges. The nearest post-office is Glenbush, thirty to forty miles distant, while Battleford is the nearest railway station and telegraph office. There are no settlers in these townships.

After completing our work here we moved to Prince Albert, where we arrived on December 8, and from there went to Prairie River to inspect the remainder of contract No. 4 of 1910. The snow now was twenty-two inches deep on the level and the weather exceedingly cold. We examined townships 44, ranges 7, 8, 9 and 10, west of the second meridian. These townships are heavily wooded with large poplar, spruce, tamarack, willow and windfall, a large portion of which is suitable for lumbering purposes. There are no settlers; in fact the country is not well adapted for settlement, there being too much timber and muskeg. The surface is level and the soil black loam with clay subsoil. There is a trail used by lumbermen from Prairie River to Red Deer river, a distance of nine miles, and there are also several pack-trails.

From Prairie River we moved our outfit by train to Mistatim and finished the inspection of these townships on December 21, this being the last work of the season.

In general terms the weather conditions for the production of crops in northern Saskatchewan were very good, a splendid yield being the result, but in southern Saskatchewan lack of rain in a measure prevented the usual bountiful harvest. The season on the whole was excellent for surveying operations, as there had not been for many years so light a snowfall as the previous winter and so small an amount of rain during the summer. Lakes, swamps and creeks which heretofore had been overflowing were comparatively dry. This was especially noticeable in the muskegs of the southeast portion of Manitoba. In the early spring lumbering operations had to shut down considerably earlier than usual on account of the scarcity of water in the rivers which were left filled with logs beached high and dry. Consequently many of the mills closed and men were thrown out of employment earlier than usual.

Moose, elk, bears, porcupines, timber-wolves, coyotes, beaver, skunks, mink, rats and rabbits were quite numerous in different localities. Prairie-chickens, partridges and ducks were very plentiful.

In many of the larger lakes and streams jackfish abound, also some sucker, whitefish, gold-eye and pickerel, especially in Greenwater, Moose, Long and Birch lakes and Red Deer river.

There are some excellent large ranges for horses and cattle along the valley of Big river (northwest of Mont Nebo), also around Witchikan, Birch and Meadow lakes. A good trail has been made recently from Battleford to Meadow lake which is about one hundred miles north of Battleford. Several ranchers have already taken advantage of the opportunities afforded them by these splendid ranching sections and have located there with numerous bands of horses and herds of cattle.

A very marked increase of settlement is noticeable throughout great tracts of country, which a year ago had but few, if any, settlers. Houses have sprung up in every direction. Post-offices have been established, schools built and roads and trail improved, while a fair proportion of land has been put under cultivation.

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APPENDIX No. 28.

REPORT OF F. H. KITTO, D.L.S.

SURVEY AT ST. ALBERT SETTLEMENT, ALBERTA.

OTTAWA, October 24, 1910.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following report on miscellaneous surveys performed in and near St. Albert settlement, Alberta, during the past season.

My work consisted of rerunning certain boundary lines in St. Albert settlement adjacent to Big lake and in townships 53, ranges 25 and 26, west of the fourth meridian, and in traversing part of Atim creek, in order to secure additional information required in issuing new plans of St. Albert settlement and adjacent townships.

I left Ottawa on August 13, and reaching Edmonton I hired a light team and buckboard and prepared to leave for the field in the morning. I began on some scattered work in open country with one man to assist me, securing farm help for digging pits when needed. After completing the most scattered parts of the work I dispersed with the horses. I secured accommodation for myself and men at a farm house on lot E., St. Albert settlement, later moving to the Astoria hotel, St. Albert, and again to the Acme Brick company's boarding house three miles south in order to keep close to my work as it progressed. Transport was secured locally for moving our baggage from place to place, and this method was found both an economical and convenient substitute for a regular camp.

After completing the work in open country thick second-growth bush was encountered. I then sent to Edmonton for additional help, and had no trouble in getting more men. The work was done with all despatch, though the weather during this time happened to be very bad, being the usual summer break-up.

On lot E of the settlement was a market garden producing a most abundant crop of all our common vegetables. Harvesting was under way in the district and all crops were exceptionally good. On the large marsh about Big lake hay was being cut and would yield about three tons to the acre. Apparently this marsh and much of Big lake could be easily drained by dredging Sturgeon river below the village, thus opening up many sections of valuable land. First-class brick is being made in section 21 of township 53, range 25, by the Acme Brick company of Edmonton. Much of the land in the township appears to be held for speculation and is covered by second-growth woods.

I completed my work on September 2, and on the following day returned to Edmonton and disbanded the party. I left for home on September 5, reaching Ottawa on the 9th.

I have the honour to be, Sir,
Your obedient servant.

F. H. KITTO, D.L.S.

APPENDIX No. 29.

ABSTRACT OF THE REPORT OF J. L. LANG, D.L.S.

SURVEYS IN SOUTHWESTERN ALBERTA.

Leaving Cowley on June 13, I reached my first work in townships 7 and 8, range 5, west of the fifth meridian on the 16th, and was engaged there until the middle of July. About that time fires broke out, due to the excessive drought, and the whole party was engaged in fighting them for about three weeks.

On August 11, I moved to township 6 and 7, range 4. These townships are very rough and packhorses had to be used for all the work done there. . .

On October 5, I proceeded to township 5, range 4, where I worked till November 12. The frequent snowfalls then made work impossible, and I was forced to move out of the mountains.

During the remainder of the season, until December 12, I was engaged on re-tracement work in townships 6 and 7, range 3, and townships 5 and 8, range 1. I also made a traverse of part of Oldman river in township 8, range 1.

The outstanding feature of the district in which I was working is the coal deposits. These seem to be widespread and of very great value. The principal companies are the International Coal and Coke company of Coleman and the West Canadian collieries of Blairmore. In addition to these there are several smaller companies, largely in a development stage, operating along the Crowsnest branch, and also a number of prospects usually some distance from the railroad.

In the valley of the Southfork there are three properties being developed which have, apparently, great possibilities, together with numerous prospects of which little can be said save that they seem promising. Until a railroad is built up this valley these properties cannot of course be put on a shipping basis. A line has already been located, however, and it is understood that the road will be built shortly. In section 34, township 5, range 4, lie the remains of an oil company floated a year or two ago. Absolutely no prospecting work had been done; the machinery is lying on the ground as it was brought in, and there is no trace of oil to be found in the vicinity. The resting place of the machinery is known locally as 'The Oil Wells.'

After the coal deposits, the principal natural resource of the district is the timber, and this has been sadly depleted by fires. The southern part of township 8, range 5, was burnt over some years ago; the northern part contains some very good timber, mainly spruce and jackpine, and lumbermen have been and are operating there. Part of this, however, was burnt this summer. Township 7, range 5, contains some good timber, but is also being cut over. Township 7, range 4, was almost entirely burnt over some years ago, but there is still some good timber along its western boundary. Township 6, range 4, is very well timbered with large spruce, jackpine and scattered fir. The country south and southeast of this township appears also to be well wooded and to be yet untouched by fire or lumbermen.

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APPENDIX No. 30.

ABSTRACT OF THE REPORT OF A. LIGHTHALL, D.L.S.

SURVEYS IN THE NEW WESTMINSTER DISTRICT IN THE RAILWAY BELT OF BRITISH COLUMBIA.

About April 16, 1910, I engaged my party at Vancouver and proceeded to lay out a piece of agricultural land cut off from timber berth No. 510 in township 6, range 7, west of the seventh meridian. This is situated at the head of the north arm of Burrard inlet and was reached by steamer from Vancouver. It is a flat alluvial strip of land in a narrow valley on the east of Mesliloot river. It will make a good piece of fertile land when the stumps and underbrush are removed.

On May 2 we moved camp to township 39, west of the coast meridian, to survey timber berth No. 535, comprising all of section 28. We reached that place by taking steamer to the British Columbia electric power plant on Burrard inlet and crossing to Buntzen lake. The berth lies on the side and top of a mountain about two thousand feet high, on the east shore of this lake. The land is too high and rough to be suitable for agricultural purposes, but a strip at the southerly end of the lake is being logged by the Patterson Lumber company.

We next proceeded to Dewdney by rail and thence by wagon to Hatzic prairie, a strip of low wet land in a valley about a mile wide and extending north and south between Fraser river and Stave lake. We first ran some section lines on the east side of the valley in township 21, east of the coast meridian. The land here is heavily wooded and lies on a fairly steep hillside. A few settlers have taken up farms. The land in the bottom of the valley is good where not too wet, and the many settlers seem to be doing fairly well in dairying and fruit-growing.

We then subdivided about three thousand acres on the west side of the valley in sections 10, 16, 21, 28, 27 and 34. Here there is an extensive tract of bench land heavily wooded with second-growth fir, hemlock and cedar. Quite a number of settlers are located here, but have done little up to the present. When the land is cleared it will be valuable for fruit growing and dairying, the soil being a sandy loam with a gravelly subsoil. When a new road is opened up the district will develop rapidly. Beaver are plentiful, their dams being found on all the small streams. Bears and deer were also seen. No minerals were found.

The survey was continued north into township 4, range 3, west of the seventh meridian. The land here, which is lower and slopes towards Stave lake, is well settled, but much of it will be flooded when the power plant now under construction on this lake is completed. The occupations of the settlers are mixed farming and lumbering on a small scale.

Our next work was in township 40, east of the coast meridian, where we surveyed timber berth No. 537. The land in this township south of Pitt river is known as 'Pitt meadows.' It is low and flat and covered with hay and small brush. It will have to be dyked and well underdrained before it can be successfully farmed. This has been done on a great part of it and it is now an important dairying and stock-raising centre. The land to the north is rough and rocky and nearly all that is suitable for agriculture has been homesteaded or taken up as timber berths. A stone-quarry is in operation in section 22; the stone is shipped to New Westminster.

We then moved to the head of Pitt lake and surveyed timber berth No. 537, on Scott creek, a swift-flowing stream, about thirty feet wide and two feet deep, emptying into Pitt lake from the east, about a mile from the head of the lake. The timber

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here is about the best I have seen, fir, cedar and hemlock growing to enormous sizes. The timber can be easily taken out as the land all slopes to Scott creek. Considerable water-power could be developed on this creek. About fifty or seventy-five acres of land will be available for agriculture when the timber has been removed.

Our last work was in township 41, east of the coast meridian. This township is fractional and consists of four sections in the valley of Silver creek. The land is mostly low, flat prairie, flooded at high water. By dyking and draining it can be made into good dairying or grain-growing land.

The party disbanded at Westminster Junction on November 22.

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APPENDIX No. 31.

REPORT OF G. J. LONERGAN, D.L.S.

INSPECTION SURVEYS IN ALBERTA.

BUCKINGHAM, QUEBEC, February 18, 1911.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following report on inspection and miscellaneous surveys carried on in the Edmonton district last season.

I left Ottawa on April 20 for Edmonton and arrived there on the 25th. After spending a few days organizing my party and purchasing supplies, I started for Clover Bar to make a restoration survey of the east boundary of sections 18 and 19, township 53, range 23, west of the fourth meridian. After a little difficulty this matter was settled to the satisfaction of all parties. Clover Bar in the winter time may be reached by a short route from Edmonton, but in the summer the only way is by Strathcona, this making a somewhat lengthy way for the farmers to haul their produce to market, which could be avoided by placing a ferry at or near the Grand Trunk Pacific railway bridge; in connection with this matter I might say that it is regrettable that the government did not come to some terms with the railway company so that a traffic and railway bridge could have been built in one, as has been done at Fort Saskatchewan. I would like to mention that Clover Bar is one of the most fertile sections of Alberta. It would require but a short drive through the country to satisfy the most skeptical that farming in this part is as profitable an occupation as a man could apply himself to.

After completing the work at Clover Bar I moved to township 53, range 28, for restoration surveys required in that township; I travelled on the graded roads from Edmonton to St. Albert, thence in a westerly direction along the north shore of Sturgeon river and around Big lake, crossing the Michael Calahoo Indian reserve. This country is very rolling and covered with poplar from four to ten inches, and a thick growth of scrub; the soil in most places is clay, or clay and gravel mixed. Although this township is not more than thirty miles west of Edmonton, the land has but recently been taken up, and it is not yet safe to speculate on the success of the settlers. However, judging from the way they have started hog-raising, they appear to be a people up to the times, and are looking after their share of easily-earned money.

My next work after completing the survey in this township was in township 53, range 3. To get there I went almost straight east, passing through the Beaver hills, a rolling and timbered country. In every direction we could see a settler's shack, and here and there more successful farmers were living in houses that would compare favourably with the average farmhouse to be seen in either Quebec or Ontario. Leaving the hills we came out in the wide open prairie at the town of Tofield. Here is exemplified in a striking manner the feelings and ideas of the westerner that nothing is impossible. Acting on this idea they have shifted their town around on three different sites. However, judging from the buildings they are now putting up they appear to have decided to remain stationary for the future.

Moving east from here to Vermilion, you pass through a town, then a thickly-settled farming district; the settlers getting gradually farther and farther apart, then

the district becoming gradually more thickly settled till you finally come into the next town, and so on from town to town; good graded roads are found on either side of the towns, and between them the old travelled trails.

We camped at night near farmhouses where the owners, with happy and contented minds and a great faith in the future, were generally speculating on the number of bushels to the acre, the price, and if they could afford to go east this year to see their friends or wait till next year.

Completing this survey I moved to Hewitt Landing and started in a northerly direction to Cold lake to commence the inspection of survey contracts. We arrived at Cold Lake Indian reserve on July 15, and at the Roman Catholic mission I visited one of the best vegetable gardens that I ever saw in any part of Canada. Everything in that line was growing luxuriantly, and not a weed was to be found inside the boundary fence. The reserve has a black loam soil, varying in depth from ten to thirty inches, but little farming is carried on by the Indians. However, the government is starting an Indian farm and last summer had two hundred and fifty acres broken. This, no doubt, will be an incentive for the Indians, as game is getting scarcer every year and now the reserve is almost surrounded by white settlers.

We forded Beaver river and moved north to Cold lake, where about a dozen families are settled. The soil is good for at least eight or ten miles around the south and west parts of the lake, and the lake itself is teeming with whitefish, jackfish and trout. One evening the men caught about two hundred and fifty pounds of the latter, which we salted and brought with us for future use.

From Cold lake we moved westward to lac la Biche. The soil between the lakes is suitable for farming purposes except a strip about ten miles wide near Punk creek or Sand river as it is known in the district. On this strip are rolling sand-hills and tamarack swamps. A very good country is to be found around Beaver lake, which, I might say, is covered in most places with four to eight-inch poplar and scattered spruce; the latter runs from eight to twenty inches in diameter, but is not found in sufficiently large quantities to warrant the establishment of a sawmill, although there is ample for the requirements of settlers. My survey party was the first to open a trail from Cold lake to lac la Biche. La Biche settlement, one of the oldest in the west, has not improved or changed in the last ten years. This is not to be accounted for by a poor soil or climate, but is due to the settlers themselves. They are half-breeds and not inclined to follow agriculture. Fishing, hunting and freighting give quicker returns for their labour and they are always in want of money so earned. White settlers have not yet started to settle the district, the reason for which, I believe, is the roundabout way to get there from Edmonton, the natural landing place for all newcomers. They would have to go first to Saddle lake, thence north a hundred miles, making about two hundred miles in all, while in a direct line the distance does not exceed one hundred and ten miles. No doubt when railways are constructed in that district it will soon be settled, and many more acres will be added to those under cultivation in the province.

Settlement is somewhat retarded along the north shore of the Saskatchewan from Edmonton eastward, and apparently the cause is the distance from a railroad and the difficulty of marketing produce. I do not hesitate to say that a railway must be built, and built soon, from Battleford west, as the country is too large and fertile to remain idle much longer.

Leaving lac la Biche we went westward over a very bad road to Athabaska Landing. The trail follows Pine creek for a distance of seven or eight miles and there passes through a large colony of negroes. From the Landing I went north, following the Lesser Slave lake trail. This road is in poor condition and the future traffic to the north country would warrant the spending of considerable money for its improvement. There are practically no settlers north of Athabaska river, although the country is fairly good agricultural land. A few large tamarack swamps that may be

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easily drained will make as good a country as man would want to live in. I returned the way I went to a distance of about thirty miles south of the Landing, where I turned straight east to examine six contracts. I borrowed a pack outfit from another surveyor and started with six weeks' supply of provisions. The country south of township 61 and west of range 17 is practically tamarack swamp; the remainder will make good farm land, but at present it is covered with poplar or scrub and a few patches of spruce. The soil consists of a few inches of black loam with a clay subsoil.

The inspection of these contracts completed, I returned to Edmonton, placed my horses in winter quarters and with a small party went by trail to Olds. Here I engaged a couple of teams and went west to inspect townships 31 and 32, ranges 6 and 7, west of the fifth meridian. These townships are well up in the foot-hills and consequently very hilly and rolling with practically no wagon trails leading to them; nevertheless, the settlers here seem to be more enthusiastic about a railway being built through their territory than those of other parts of the province. They insisted on showing us the easy location through their quarter sections and did not regard the high hill at one end of their proposed railway and the deep ravine at the other as obstacles; in fact, they are only interested in having the station conveniently close to their shacks.

After completing this inspection I returned to Olds, left the horses with their owner, and took the train back to Edmonton. Here I stored my outfit, discharged the remainder of my party, and left for home, arriving at Ottawa December 12.

I have the honour to be, Sir,

Your obedient servant,

G. J. LONERGAN, D.L.S.

APPENDIX No. 32.

ABSTRACT OF THE REPORT OF C. F. MILES, D.L.S.

INSPECTION OF CONTRACT SURVEYS NEAR BATTLEFORD AND MISCELLANEOUS SURVEYS IN SASKATCHEWAN AND SOUTHERN ALBERTA.

I left Toronto on May 17, 1910, for Maple Creek, south of which place I commenced work, reinspecting contract No. 8 of 1909.

Establishing the remaining monuments in township 24, range 4, west of the third meridian, was accomplished by the 23rd, and on the following day we left for Maple Creek, arriving there on May 30. After outfitting there, we left again for Battle Creek post-office, and thence started for section 31, township 3, range 28, in Mr. Kimpe's contract No. 8 of 1909, arriving there on June 2.

I completed the reinspection here on the 3rd and the following morning started for township 3, range 3, west of the fourth meridian.

I reinspected a block of four sections there, completing the work on the morning of June 7, when we left for the Hooper and Huckvale ranch on Manyberries creek, passing on our way the Penlan ranch, where we saw a number of horses, but no cattle. North of this ranch several new settlers' shacks were passed, and quite a few new houses were observed at a distance to the north.

Owing to the late and dry spring, the outlook for the new settlers did not appear propitious, and I was credibly informed that several contemplated moving to another section of the country where the rainfall is somewhat heavier than in this southern country. I have stated in previous reports that I consider the country along the international boundary fit only for horse and cattle ranching; nevertheless, homesteaders crowd in there, break up the land and then abandon it as being too dry. After the land is broken up it is fit for nothing, the native nutritious grasses being exterminated and a rank growth of weeds taking their place.

From there we travelled on to section 9, township 8, range 8, passing Spring lake on the way in the vicinity of which there are several sheep camps. One of these belonging to Mr. Young aggregates 10,000 head of sheep. His main winter camps are in the vicinity of lake Pakowki.

We completed the reinspection of contract No. 8 of 1909 on June 11, and on the following morning started on our return across country, passing through a fairly well-settled country towards Maple Creek.

On the arrival of my outfit there on June 15 we stopped over a day to lay in a supply of provisions and engage a few more men, then left for township 14, range 25, west of the third meridian, where I was to make a restoration survey of several townships around Bigstick lake.

From the valley of Maple creek north, the country is well settled, the soil consisting principally of a sandy loam, but on approaching the lake it becomes lighter until in the immediate vicinity of the lake to the southeast and east it becomes almost pure sand and shifting sand-hills.

Cattle and horse ranching is carried on here on a limited scale. Though the soil is light the vegetation appeared to be of a fairly vigorous growth.

Although the vegetation here was more luxuriant than in the south, yet the short grasses of the south are much preferred by cattle and seem to contain greater fattening qualities.

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I closed my work here, leaving the northerly one-third of township 15, range 25, undone, and started for Maple Creek on July 11 with the intention of shipping my outfit and horses by rail to Prince Albert.

I arrived at Prince Albert on the 15th, but had to wait for the car containing the wagons, harness, &c., until the 22nd, an exceptionally long time between Maple Creek and Prince Albert. However, I hired some teams to take us out to township 48, range 27, west of the second meridian, where my restoration surveys were to commence.

I noticed a gradual improvement in crops and verdure generally after leaving Maple Creek.

From an agricultural point of view, the soil on the prairie, more particularly in southern Saskatchewan, is generally composed of a stiff clay, verging on hardpan, whereas the soil in a bluffly or wooded country has a greater or less covering of vegetable matter or humus, making the latter more productive than the former. The latter is frequently underlaid by a light sandy soil, which, while producing more luxuriant vegetation, does not demand the same amount of humidity as the heavier clay soils.

From Prince Albert I first moved west, north of Saskatchewan river. It is nearly all wooded, except where fires have destroyed the timber; there is a great deal of jack-pine, which indicates a light sandy soil. Near the banks of the river vegetation is generally more exuberant in growth, and the soil, although sometimes light, is overlaid by a covering of decomposed vegetable matter.

A few settlers are scattered along the north side near the river, but on the trail leading to Shellbrook there are miles of sandy stretches covered with jackpine and unfit for settlement.

A railway is constructed from Prince Albert to Shellbrook, but no regular trains were running at the time. When once in operation it will probably result in opening up the good country said to be in the Shellbrook district.

After completing the resurvey of fractional townships 48, ranges 27 and 28, I moved eastward, passing Prince Albert along an old trail, fair in places, but rather rough where cut through the woods in township 49, range 24.

I completed the resurvey of this township on September 9, and after making a traverse survey of Badger island, which is thickly wooded and is a part of this township, I returned to North Battleford, going by the Canadian Northern railway from Prince Albert.

My outfit arrived at North Battleford on September 15, and after repairing wagons, shoeing horses and purchasing supplies we left North Battleford on the morning of the 17th, taking the Jackfish lake trail for the scene of my inspection work in the vicinity of Turtle lake.

North Battleford, altogether distinct from old Battleford, lies on the north side of Saskatchewan river and is a growing town and separate municipality. It has outstripped old Battleford, south of the river, and has a population of about 1,500. Anything a settler may require can be purchased there, and this town seems destined to become the distributing point for a large district to the north. So far it is the only place of any importance on the north side of the river, being always accessible, regardless of the state of the river.

A good traffic bridge spans the river from the north town to the south town, being a drive of about three miles, whereas by rail the distance is about fifteen miles.

After travelling for about thirty miles along the old surveyed trail, running northwesterly from North Battleford and nearly parallel to a branch of the Canadian Northern railway, we touched the western shore of Jackfish lake, a large sheet of water, slightly alkaline, where quite a little settlement has sprung up with the expectation of this becoming a future summer resort.

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At Jackfish lake we left the old surveyed trail, which continued northwesterly to the Onion Lake Indian reserve and mission, and followed the trail that runs in a more northerly direction called the Turtle lake trail. The country in this vicinity seems very well suited for farming.

Brush and scrub became more frequent as we proceeded north, and when at last we reached the vicinity of Turtle lake we entered almost solid bush.

On the south half of section 26, township 52, range 19, at the outlet of Turtle lake, there is a store or trading place kept by a Mr. Warner, an old trapper and trader.

From the outlet of the lake one follows a narrow Indian wagon road, cut northerly through the bush on the west side of the lake to township 54, range 19, west of the third meridian, this being a part of contract No. 9 of 1910.

This township and the whole of this contract may be more easily reached from the south by a trail that runs westerly from Warner's store on section 26, and thence westerly and northerly east of Brightsand lake.

In the westerly part of this township there are some openings, the timber having been cleared off by repeated fires, but north from here it is nearly all solid bush.

The open parts may be made available for homesteads almost at once, and on the northeast side of Brightsand lake up to range 24, township 54, there are areas of open country, but northerly it is more densely wooded.

Trails to Loon lake and to Meadow lake, north and northeast of these contracts, pass through these townships, and are travelled principally by Indians and half-breeds who are settled on those lakes.

At Meadow lake there are said to be a number of settlers, principally half-breeds, and also a couple of trading posts.

These trails in the fall were in a very fair condition, but in the spring or in a wet season there must be many places too soft to pass through with wagons. The soil is mostly a black loam, averaging only about three inches in depth, the subsoil varying from white sand to sandy and white clay and hardpan.

Wherever openings are found they are adapted to immediate settlement.

Many trails, that may be utilized in the future by incoming settlers, have been opened out in this district by contract surveyors.

Westerly from range 23 a great many lakes and ponds are found. There are said to be fish in some of them, more particularly I may mention Ministikwan lake in township 58, range 25, on the north side of which there is a newly-surveyed Indian reserve where the Indians were catching whitefish.

In some townships to the north, thousands of tons of hay may be cut in the meadows and many haystacks were seen that had been put up by the Indians for stockmen who were driving their cattle in from the south. Part of this district might be an ideal cattle country, providing the flies were not too troublesome. Domesticated cattle would suffer terribly in a bad or wet season, as at times the little black-fly the worst pest, and the large bulldog fly would become unbearable unless the animals were properly protected with smudges and had sheds for shelter.

Range cattle may possibly be more hardy, and may be better able to withstand the plague of flies and mosquitoes. Cattle, ranging on the open prairie, have not the black-fly to harass them. The past season neither mosquitoes nor black-flies were so numerous, but the latter lasted long into the cold weather, even after several severe frosty nights.

This part of the country is not yet ready for immediate settlement on account of its being almost entirely covered with dense bush or brush.

We finished the inspection work of contracts Nos. 8 to 13 on November 14, and my party broke up camp and started for Onion Lake mission or settlement on the following day.

After completing the subdivision of the dry bed of Many Island lake near Walsh, I closed operations for the season on December 14.

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APPENDIX No. 33.

REPORT OF R. D. McCAW, D.L.S.

EXAMINATION OF LANDS IN THE RAILWAY BELT, BRITISH COLUMBIA.

CALGARY, February 16, 1911.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following report regarding my operations during the past season in connection with the examination of lands in the Kamloops district of British Columbia.

On May 9 I began the necessary preparations for the season's work, and shipped to Savona, B.C., the packhorses and outfit provided for my own party. I left Calgary on May 12 and stopped off at Kamloops to make arrangements for different items, proceeding to Savona on the 14th.

My first camp was located on Three-mile creek, about five miles southeast of Savona, and examination started in the immediate vicinity. In the meantime I had received word that A. V. Chase, of Orillia, Ontario, had been appointed to take charge of a sub-party which I was to have, and I proceeded to get a party and outfit ready to place in his charge.

With this intent I went to Kamloops and engaged a cook and one man, and also procured part of the camp outfit. On May 24 I went to Calgary to ship packhorses. Owing to delays in getting the horses from Logan's ranch and in getting a car for shipping, I was detained until May 31. On the 30th I had shipped the horses and other necessities for the outfit in charge of J. E. Smith, whom I had engaged as packer. I reached Kamloops to find that one man whom I had engaged did not put in an appearance, so engaged another and proceeded to Savona on the morning of June 2, and finding that Smith had arrived with the car, at once proceeded with the outfit to my own camp.

During my absence my assistants took charge of the work which I had laid out for them before my departure, and Mr. Chase arrived in camp on May 30.

Camp was then moved to Tunkwa lake and Mr. Chase was assigned a party and outfit to commence examination in that vicinity, working upon the instructions I had received. I then moved my camp south to the junction of Guichon creek and Meadow creek and commenced examination in that vicinity. I then directed my movements westerly through Highland valley along Witches brook and Pukaist creek to Thompson river. I had made arrangements with Mr. Chase whereby he would conduct the examination in townships 18, ranges 21 and 22, and also north of the correction line between townships 18 and 19 to Thompson river. South of this and as far as Nicola river I examined personally, and visited Mr. Chase's camp on June 24 to see how he was progressing.

On the 30th I moved camp to Spence's Bridge. Owing to there being no road for part of the way from Spatsmum to Spence's Bridge on the east side of the river, I was compelled to send the wagons to Spence's Bridge via Ashcroft and the road on the west side of the river. Work was then proceeded with on the north side of Nicola river. Camps were located at convenient intervals along the river. The examination was concluded in this area on July 30.

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On Monday, August 1, I started to move towards Long Lake Forest reserve. It took me three days to make the trip and locate a camp. The move was made via Lower Nicola and the Nicola-Savona road along Guichon creek and by a settler's road along Meadow creek into township 17, range 20.

By previous arrangement between Mr. Chase and myself it was agreed that he should continue the examination between the fifth correction line and the Thompson valley east to the west limit of Mr. Wheeler's examination of 1909, while I continued the work south of that correction line to the said west limit of Mr. Wheeler's examination.

From August 4 until the 31st I was engaged upon examination in townships 17 and 18 in ranges 18, 19 and 20. Camp was moved along a settler's road following Meadow creek to Trout lake, and then along the graded road constructed from Kamloops to Trout lake. During my stay in this vicinity we had a number of rainy days and experienced the coldest weather during the season, the thermometer registering as low as eleven degrees towards the end of the month.

On August 22, in accordance with instructions from me, Mr. Chase met me in Kamloops and I assigned further work for his party in the Monte Hills and Martin Mountain Forest reserves and lands adjoining that were unexamined.

When the work of examination was completed by me in the Long Lake Forest reserve area, I proceeded to the Niskonlith Forest reserve via Kamloops, and commenced work in that vicinity from a camp located in the northeast corner of township 20, range 15. The next main camp was located near Louis lake, and I then moved to the northeast corner of township 21, range 15, locating my camp beside Louis creek on September 27. From this date on rain and snow greatly retarded work in this locality, so much so that I was losing time. Feed for the horses was getting scarce and I could not procure hay from the settlers. Taking these matters into consideration, I decided that the work of examination to the north of Niskonlith reserve not already done could not be made at that season, so on October 11 I moved my camp to Kamloops en route to Tranquille Forest reserve, where I knew there was feed for the horses and less wet weather in that locality at this time of the year.

On October 13 I located a camp near a small lake in section 34, township 21, range 18, and commenced work in the Tranquille Forest reserve and vicinity. From this camp work was done north and northeast, closing on my examination of 1909 under the direction of A. O. Wheeler, D.L.S. The last main camp was located at Watching creek near the south limit of Tranquille Forest reserve on October 29. In accordance with instructions given him to join me when he had completed examination in the Monte Hills and Martin Mountain reserve and vicinity, Mr. Chase arrived at my camp on November 9 and assisted me in the remaining work that could be done during the remainder of the season. Snow greatly hindered the work during November and I broke up camp on November 21 as it was becoming impossible to accomplish a full day's work.

I paid off all the men except Mr. Chase and the two packers, and on November 23 shipped a car with horses, pack-saddles, &c., to Calgary in charge of one of the packers. I arrived in Calgary on the evening of the 24th, and the car with the horses arriving on the 26th I sent them out to Logan's ranch in charge of the packers, where I had procured winter quarters for them. The packers were paid off on the 28th upon their return from Logan's.

Many times during the season it was exceedingly difficult to obtain feed for the horses. Pasture was poor and the hay crop a partial failure. Often in order to feed the horses I was compelled to pay high prices for pasture and hay.

In conducting the examination the methods employed were similar to those used by Mr. Wheeler in his previous work of examination.

When the lands examined were situated within surveyed territory the survey lines were traced out and sections traversed in such a manner that an intelligent

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report could be prepared describing the lands. In unsurveyed territory traverses and approximate production of the township subdivision lines were made to locate the areas reported on.

Traverses used as bases for examination were either run out by compass and chain or with stadia.

Throughout, in examination, lines were dependent on box compasses for direction and pacing for distance, with the assistance of tally-registers. Elevations were referred to sea-level and were determined by means of aneroid barometers carried in the field by the examiners and compared for fluctuation of atmospheric pressure with stationary aneroids in camp which were read every two hours throughout the day. Elevations along the Canadian Pacific railway and other elevations on the Kamloops and Sicamous sheets according to James White, F.R.G.S., Geographer, were used as authority for altitudes. Records of maximum and minimum temperatures were taken throughout the season.

The report of A. V. Chase, D.L.S., who had charge of the sub-party is annexed.
I have the honour to be, Sir,

Your obedient servant,

R. D. McCAW, D.L.S.

REPORT OF A. V. CHASE, D.L.S., ON OPERATIONS IN EXAMINATION OF LANDS IN KAMLOOPS
DISTRICT, 1910

CALGARY, January 26, 1911.

R. D. McCAW, Esq., D.L.S.,
Calgary, Alta.

SIR.—I have the honour to submit the following report on my operations in examination of land in the Kamloops district during the months of June to November, inclusive, season, 1910.

In compliance with the instructions of the Surveyor General to report to you at Savona, B.C., I left Orillia, Ont., on May 25 and reached Savona on May 30. On the arrival there of your packer I proceeded at once with him to your camp on Three-mile creek the same day. As work from that camp was then about completed. I waited for your arrival with my party and outfit on June 2.

After completing the distribution of men, outfits and supplies I moved camp to Tunkwa lake in township 19, range 21, west of the sixth meridian, on June 3, where I commenced work for the season examining lands convenient thereto.

On June 15 I moved camp into Guichon creek valley to a point near the north-east corner of section 19, township 18, range 21, and examined the lands in and adjacent to this valley, using this as a main camp for most of the work, which was completed from a flying camp in the valley just south of the township.

On June 24 I moved the main camp to a point near Divide lake in Highland valley, leaving one tent and two assistants to complete the work in Guichon creek valley, which they did, and arrived at main camp on the following day. As the country to the north of Highland valley is very high and of little value, only a few days were necessary to examine and describe it, so I was able to complete this part from two other camps in Highland valley and move camp to Spatsum on July 5.

From here work was continued along the bench land on Thompson river and back into the mountains to the east. As there was no feed for the ponies in the eight-mile

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stretch between Spatsum and Thompson's ranch on lot 95, and no drinking water except at these points and in Thompson river, these places were used as camping grounds for examination of this locality.

On July 15 I moved camp to the north end of Barnes lake and continued examination of lands in the vicinity of Ashcroft and to the southeast, moving up Barnes creek to examine lands to the southeast and adjacent to Glossy mountain, on July 20.

From here work was continued easterly examining undisposed-of lands to the south of Thompson river to close on work done in the vicinity of Savona in the beginning of the season. This portion was completed and our first camp on Three-mile creek again reached on August 6. Thence work was continued eastward examining lands undisposed of between the fifth correction line and Thompson river, including lands in the Long Lake Forest reserve and timber berths Nos. 420 and 330, and as far east as the lands included in the examination by A. O. Wheeler, in 1909.

On August 21 I left camp en route for Kamloops to meet and confer with you on further work, and having done so, returned and reached camp on the 23rd. This portion of the work was finished on September 13.

On the 14th I moved camp to Bulman's ranch at the north end of Trapp lake en route for the Monte Hills Forest reserve. Some little delay was here experienced, through the difficulty of finding any one who could direct me to convenient trails and none seemed to know the whereabouts of old survey lines. Mr. Bulman being absent from his ranch at the time.

However, on September 16 camp was established in township 17, range 16, near the south end of Roche lake, and work was commenced, the boundaries of the reserve traced out and examination of lands begun.

On account of the sharp and continued rise to eastward and the thick growth of small jackpine through which it was impossible to travel at much greater speed than one-half mile per hour, I found it necessary to cut out a traverse line to use as a base for operations in the interior, there being no lines surveyed within the boundaries in this part. However, on September 27 the traverse line was completed, and on account of the altitude and nature of the country little detailed examination was necessary in this locality and the work was completed in the southwest portion of the reserve on October 3.

On October 4 camp was moved to a point east of Fish lake and north of the reserve. Similar proceedings were necessary here, but great assistance was rendered by J. A. Bleeker, a rancher, who went to much trouble to show us the trails in this part and the lines surveyed in the locality. Examination of the northwest part was completed, and moving to the eastern part of the reserve was commenced on October 18. The wagon, which my packer had brought from your camp, proved of great assistance here as the pack ponies seemed unable to stand continued long moves for more than three or four days at a time, and it would have been impossible to move our outfit and fresh supply of provisions all at one time on our ponies alone. With the help of the wagon the move to Monte lake was accomplished in three days without any loss of time. Camp was established at the south end of Monte lake on October 20 and examination of the eastern part of the reserve commenced. On account of the altitude and nature of the country here little detailed examination was necessary except in the southeast part, and the whole was completed on October 28. Camp was moved and examination of the Martin Mountain Forest reserve commenced on the east side on October 31, the examination of the same being completed on the west side on November 3.

In accordance with your instructions, I commenced the move to Kamloops on November 4, en route for the Tranquille Forest reserve to join you and assist in the completion of such work as could be done there before the close of the season. I arrived at your main camp on Watching creek on November 9, being delayed one day en route getting supplies for the remainder of the season.

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Great trouble was experienced throughout in providing feed for the pack ponies. In a great many localities grazing was burnt out or eaten off completely. Many settlers did not have enough hay for their own use, and the result was that I was compelled to buy much feed and pay rather high prices at times.

I have the honour to be, Sir,

Your obedient servant.

A. V. CHASE, D.L.S.

APPENDIX No. 34.

ABSTRACT OF THE REPORT OF J. B. MCFARLANE, D.L.S.

SURVEYS IN THE BRAZEAU DISTRICT IN SOUTHWESTERN ALBERTA.

I left Edmonton on April 5 and reached Prairie Creek on the 22nd. As the trails to the head of McLeod river were still blocked with snow we surveyed nine miles of line around Prairie Creek settlement.

We reached 'Indian Grave' near Southesk river in township 45, range 21, west of the fifth meridian, on May 5, and from there proceeded to the eleventh base line. While producing this base line across range 19 on May 11, we had a snowfall of ten inches, which, added to the snow still deep in the ravines, made progress rather slow.

During June and July we were engaged on subdivision work in townships 39 and 40, ranges 16 and 17. These townships can be reached by a trail along Saskatchewan river from Red Deer or Lacombe via Rocky Mountain House. There is also a pack-trail from Laggan through the mountains.

This district is valuable only for its coal deposits, as the short season with frost and snow every month renders agricultural pursuits impossible. That ranching could be carried on is doubtful, as grass is scarce, except in some of the valleys, where it would be difficult to cut on account of the willow growing among it. However, some Indian ponies and cattle were seen which had wintered out.

The country is generally rough, and the Saskatchewan valley crossing township 39, range 16, in a northeasterly direction is bounded by high hills on either side. The Bighorn mountains occupy a large part of township 40, range 17, and these are surrounded by high rocky hills. The soil varies from sand and fine clay, gravel and stones, to solid rock, and the loam on top is usually thin. The land is covered for the most part with scrubby timber, but it is more open along Saskatchewan river. A few small areas of good spruce timber are located in the west and north parts of township 40, range 16. Water is plentiful in the numerous creeks. Power might be developed from the rapids on some of the creeks, but the only distinctly valuable natural power is at the 'Falls' on Bighorn river. This consists of two falls, the upper fifty-one feet and the lower thirty-four feet, and only a few chains apart. Wood fuel is plentiful and coal outcrops were seen over a considerable area. No stone-quarries are opened and no minerals were noticed. The game consists chiefly of deer, black bears, a fairly plentiful supply of partridges, a few beaver and other fur-bearing animals.

We left Bighorn river on July 26 by the well-worn trail to the north and camped near the twelfth base in range 21 on August 1. Here we ran the twelfth base across ranges 21 and 22 and the outlines of township 45, range 22; we also subdivided a large portion of this township and ran seven miles in the southwest corner of township 46, range 22.

This district is reached by pack-trails along Embarras river, thence to Brazeau and Southesk rivers, or by going up McLeod river and following either its easterly or its main branch, or again by travelling from Prairie Creek to the McLeod and thence along this river. This latter route was used as it avoids many crossings of the McLeod and is more convenient to places where feed can be bought.

This district is unsuitable for agriculture on account of the short season, with frost and snow every month, and is chiefly valuable for its coal deposits, some of which are of considerable size. Veins have been opened twenty and twenty-four feet

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thick and yield a fair quality of soft coal which, it is stated, will coke. The country is mostly rough with many rocky hills; a mountain range crosses the middle of the west boundary of township 46, range 22, running southeasterly across the northeast corner of township 45, range 22, then dropping in altitude in the next range. Bare hills above timber-line cross the west and south boundaries of township 45, range 22. The valleys not drained by large creeks or rivers are usually very soft muskeg so that trails are bad in some places. The surface is mostly covered with small jackpine and spruce, and though some places are valuable for tie timber, the trees are usually too small for lumbering purposes. A patch of spruce of good quality, but not very large in extent, stretches partly up both sides of the mountain on the east boundary of township 45, range 22. There is no hay, but a number of meadows producing 'bunch-grass' afford good pasture all summer. These meadows are all formed by creeks, usually running underground and flooding the meadows after rains or when snow melts. Water is plentiful and fresh in the numerous creeks. It rained twenty-three days in August, the rain usually turning to snow, especially in the latter part of the month. In September and October also a great deal of wet snow fell. Creeks and rivers have rapid fall so that power might be developed by dams. Wood fuel is everywhere plentiful as well as coal. No stone-quarries are opened nor were any minerals of economic value seen. Game consists of deer, caribou, mountain-sheep, bears and a few small fur-bearing animals.

On account of the great amount of snow I was obliged to close my operations for the season on October 21. I arrived in Edmonton on November 3, where I disbanded and paid off my men.

APPENDIX No. 35.

ABSTRACT OF THE REPORT OF GEORGE McMILLAN, D.L.S.

SURVEY OF PARTS OF THE SIXTEENTH, SEVENTEENTH AND TWENTIETH BASES WEST OF THE SIXTH MERIDIAN.

I left Edmonton March 18, and crossed the Athabaska on March 23. This was the last crossing made on the ice that spring, and at the Landing we had to exchange our sleighs for wagons. Grouard was reached April 3, but we were delayed at Little Prairie by sickness in the party and because the ferry at Peace River Crossing was not running until April 26. Saskatoon lake was reached on May 5, and our starting point on the seventeenth base on May 26.

The survey was begun in the middle of range 9 where the rise to Nose mountain begins. This mountain is simply a hill higher than any of the surrounding hills. It is a series of three crescent-shaped ridges with the concave sides facing north. It is about four miles long from east to west, and twelve miles north and south. On the north slope, which is timbered, many small streams rise which converge about four miles north, and flowing northwesterly through a valley six hundred feet deep empty into Nose creek about twelve miles north of the base line, which in turn empties into Red Deer river in township 68, range 11. Small poplar and willow grow on both sides of the valley, but there is no marketable timber. The soil above the valley is burnt to a cinder and the boulders are cracked and crumbling from the heat of the fire which swept this district. Willow scrub is beginning to grow.

The general surface north of the line may be described as rolling, with some scrub. When new soil forms here the land will be suitable for farming, and this is the only land along the portions of the sixteenth and seventeenth base lines surveyed this year that will be suitable. Coarse wiry grass grows everywhere, but there are no hay lands.

The valley of Nose creek is about three hundred feet deep and about three miles wide. Some good spruce and poplar grow here and become thicker and larger to the north.

North Sheep creek, which is about four and one-half chains wide, rises in the glaciers, and flowing through a valley about three miles wide and four hundred feet deep, empties into Wapiti river in British Columbia. Its west banks are so steep and slippery that horses cannot climb them. The surface to the west has been burnt over and only isolated patches of green timber remain.

Cutbank river rises in Nose mountain in range eleven, about four miles south of the base line, and flows east to Smoky river. Its valley is strewn with dead timber through which is growing a thick jackpine scrub. The lands above are about the same. At the southeastern extremity of Nose mountain there is a berth of green timber about six miles by two miles. This timber is suitable for ties and with that in the Porcupine valley is the only merchantable timber between the sixteenth and seventeenth base lines and Nose mountain and Smoky river.

The seventeenth base line was completed on July 2, and our starting point on the sixteenth base line at the northeast corner of range 5 was reached on July 19. To reach this point we travelled by the Nose creek trail over Nose mountain and other great hills and then across a series of swamps to Porcupine river. North of the Porcupine, near the trail, is a prairie about five miles long and twenty chains wide; the grazing here is good.

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Porcupine river is a swift mountain stream from three to ten feet deep, about five chains wide and having a current of about three miles an hour. It rises and falls rapidly; it may be possible to ford it in the morning and by evening it may be three feet deeper.

The country along the sixteenth base in ranges 5, 6 and 7 comprises an area of high dome-shaped hills covered with large fire-killed spruce and jackpine. The fire here was more recent than farther north and the trees are still standing firmly rooted. In range B there is a forest of green spruce and jackpine, extending about six miles southwesterly. This contains considerable marketable timber fit for ties and lumber.

The valley of the Porcupine was entered in range 8, and the base line continues in this valley to its crossing in range 11. To the south of the valley is a series of hills extending back to the Rockies, which in range 9 are about ten miles south, in range 11 about five miles south, and intersect the line in section 32, range 13. Range 11 west of the Porcupine is hilly, and the mountains may be said to be entered at the beginning of range 12, although the obstruction was not sufficient to stop the work until section 32 in range 13 was reached.

Ranges 12 and 13 are well timbered with fir, spruce, jackpine and balsam. This timber is accessible by both branches of Stinking creek. They rise in the mountains and converge in range 13, and flowing north and west empty into North Sheep creek in British Columbia. The west branch is about two chains wide, two feet deep and very swift, and has a valley averaging about three miles wide and eight hundred feet deep.

On October 12 I left for Grande Prairie and the twentieth base line. We followed the trail by way of the west branch of Stinking creek, Two lakes, Nose creek and Jasper trail, to Grande Prairie. After a few days rest here to allow the horses to regain their strength, we left by wagon road for the twentieth base line on October 26. A snowstorm came on unexpectedly on November 2, and we were delayed some days awaiting the arrival of our flat sleighs from Grande Prairie, and did not reach our starting point at the northeast corner of range 13 until November 21.

Ranges 15 and 16 contains some poplar, spruce and jackpine timber suitable for building, ties and lumber. Range 17 is hilly and largely covered with fallen timber and jackpine scrub.

Pouce Coupe prairie begins in range 14 about eight miles north, and runs in a northwesterly direction to Kiskapiska river. The prairie is rolling and scrubby, and appears to be the result of forest fires. The soil is a rich clay loam with a white clay subsoil. It comprises hay lands and sufficient timber for fuel and building purposes, but surface water is scarce. There is a community of five families of half-breeds and eleven white settlers on the prairie, now located in about township 78, range 14.

In June and July the thermometer registered from 60° to 110° in the daytime but the nights were cool. August was very wet, and mists and fogs were prevalent. A snowfall of one foot occurred on August 22 and 23, and the leaves were shed by September 1. On October 11 the ponds were frozen over, and there was an inch of frost in the ground and four to six inches of snow. Real winter began November 2. Snow fell almost every day during the month, and the thermometer varied from 0° to -40°. December was fine but in the last of January -60° was registered.

Fresh water is abundant everywhere, no bad water being met with all season. There was an absence of mosquitoes and kindred pests.

No minerals were met with but many of the boulders scattered over the district carry iron. Springs in the vicinity of Nose mountain deposit a white solid substance like lime, but the water is tasteless and colourless. There is considerable building stone along the tributaries of the Porcupine.

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Moose are plentiful everywhere, and grizzly and black bears roam in great numbers south of Red Deer river. Foxes, marten and lynx are almost extinct. Muskrats are numerous, but there are no beaver. Ducks and partridges are rarely seen while whitefish are plentiful. In Pouce Coupe the following animals are to be found although none of them are numerous: moose, black bears, grizzly bears, wolves, foxes, lynx, mink, marten and coyotes. Jackfish are caught in Bear creek.

All streams have sufficient natural fall for the development of water-power, but the volume of water is not always sufficient. Porcupine river and North creek have sufficient volume at all times, and Nose creek and Capton creek at high water. The building of dams would not be expensive as the banks are high and often approach the water's edge.

APPENDIX No. 36.

ABSTRACT OF THE REPORT OF A. L. McNAUGHTON, D. L. S.

SURVEYS IN THE BRAZEAU DISTRICT, WESTERN ALBERTA.

I arrived in Edmonton on April 26 but my horses and camp outfit which had been wintered at Duck lake did not arrive until the 30th. We did not leave Edmonton until May 17, as the season was late and feed for packhorses scarce. The intervening time was spent in purchasing horses and completing my outfit, and in preparing returns of the surveys performed by me during 1909.

We travelled by train to Wolf Creek and from there by wagon and pack-train to 'big eddy' which we reached on May 21. Thence we travelled by pack-trail to the junction of the two branches of Embarras river about half a mile north of the thirteenth base line. From this camp we began our work on May 28 on the east boundary of range 19 southerly. We then began the survey of the east boundary of range 20 and were occupied with these surveys and the subdivision of township 47, range 19, until August 12.

An attempt was made to reach the twelfth base and run the east boundary of range 19 northerly but, having reached the Brazeau by trail along the Pembina and thence southerly, no trail could be located leading westerly along the Brazeau and we were compelled to return to township 47, range 19. On September 19, we moved to township 48, range 21 and were occupied until December 8 with subdivision surveys in townships 48 and 49, ranges 21 and 22. This district has been burned over and is covered with very dense dead timber.

On December 9, we left the field and arrived in Edmonton on the 17th. We left Edmonton again on January 9 and arrived at the coal mines of the Pacific Pass company on January 17 and following the same route as in the summer we reached the Brazeau on the 21st. By means of ropes the flat sleighs were let down the high steep banks of the river and reached the junction of the Brazeau and Southesk on January 23. We then ran the east boundary of range 9 north from the twelfth base about two and one-half miles and did a few miles of subdivision in the neighbourhood. We then moved north along this outline where we continued work until February 27. We then closed operations and I returned to Bickerdike to send in supplies for the next season. The supplies were purchased and forwarded to the Pacific Pass mines and I returned to Cornwall, Ont., on March 16.

With the exception of township 48, range 19, the country traversed during the season's work lies within foot-hills which vary in height from one hundred to fourteen hundred feet. Most of this country has been swept by forest fires and is now covered with dead and fallen timber and usually a second growth of small jackpine. The only timber of any value seen during the season is in townships 48 and 49, range 22 where a heavy spruce and jackpine forest remains as an indication of what the timber in surrounding districts must have been before destruction by forest fires. Spruce up to three feet in diameter were frequently encountered along our lines and, in the surrounding brule country, we sometimes found dead spruce of even greater size. There are also some large green spruce along Pembina river both above and below the mouth of the Little Pembina.

Good coal is found in the range of hills which forms the divide between Pembina and Embarras rivers and in the hills northwesterly from this point to McLeod river. These deposits are being prospected by two companies, the Pacific Pass Coal

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company and the Yellowhead Pass Coal and Coke company, both of which have in view extensive mining operations in the near future.

At present the only way of reaching this district during the summer months is by pack-trails, of which the most convenient starts from 'big eddy' and follows south along the valley of McLeod and Embarras rivers. About five miles south of the mouth of the Embarras this trail divides, one branch following the west fork of the river to the Yellowhead Pass Coal and Coke company's property and the other the east fork to its source, thence crossing the watershed to Little Pembina river on which is situated the property of the Pacific Pass Coal company. In winter both properties can be reached by sleigh road. The Coal Fields branch of the Grand Trunk Pacific railway, now under construction will, when completed, open up this district.

Suitable land for agricultural purposes is limited to small flats found here and there along the river valleys. The largest of these I have seen is on Pembina river, near the mouth of the Little Pembina. Summer frosts are too frequent and severe to make these flats valuable other than as grazing spots for horses and cattle.

Game is very scarce, only a few deer being seen during the season. Caribou are found in the Brazeau valley but not farther north. Partridges are very plentiful in districts that have not been touched by forest fires.

During the summer months our work was somewhat hindered by rain, thunderstorms occurring frequently in the afternoons, the morning being generally fine. These clouds come from the mountains and their approach is plainly visible for hours from the hilltops. As a rule, they do not break immediately after leaving the mountains but pass over thirty or forty miles of territory before discharging their contents. The soil is always water-soaked and even the hilltops are covered with a thick spongy moss which I have seen elsewhere only on the Pacific coast of British Columbia. Fine clear nights are nearly always accompanied by frost except during the month of July. To these frosts I attribute the scarcity of mosquitoes and black-flies with which pests we had practically no trouble. "Bulldogs" were not affected by this however, and worried the horses a great deal during June, July and August.

During the winter months, the cold was not as a rule severe being moderated by frequent chinook winds. On several occasions however we experienced very severe weather, the thermometer registering fifty degrees below zero.

Good water was always available, and on Brazeau river there are opportunities for an economical development of water-power. As this must compete with coal, mined on the ground, it is doubtful if there will be any power development in this neighbourhood in the near future.

I would say that the future prospects of this district depend almost entirely upon the success achieved in coal-mining operations. Experienced miners who have visited it say that a good grade of steam coal suited for use in locomotives and for fuel can be obtained and my own observations have convinced me that the quantity is almost unlimited. The experts of the Grand Trunk Pacific and Canadian Northern railways have doubtless made a favourable report on the coal deposits as both of these companies have branches under construction into this district. Such being the case, a large part of the fuel used in our prairie provinces will doubtless come from this source.

APPENDIX No. 37.

ABSTRACT OF THE REPORT OF W. F. O'HARA, D.L.S.

MISCELLANEOUS RESURVEYS IN SOUTHERN ALBERTA.

My work during the past season consisted of miscellaneous resurveys in southern Alberta, and a survey of villa lots at Waterton lakes and town lots at Pincher Creek.

I reached Milk river in township 2, range 7, west of the fourth meridian on June 29, and commenced the retracement of the township. It was also necessary to resurvey part of township 2, range 8, and the north boundary of township 1, range 7, in order to get all blocks to close within the limit allowed.

These townships are in the semi-arid district. The soil is a hard firm clay and requires to be ploughed about eighteen inches deep in order that sufficient moisture may be retained in the soil to mature the crops. The summer of 1910 was the driest on record. The prairie grass turned yellow owing to the drought, and the oats headed out when only six inches high.

After completing the surveys required in ranges 7 and 8, I proceeded up Milk river by wagon trail to range 20 west of the fourth meridian, where work, similar to that in ranges 7 and 8, was required.

This region consists almost entirely of large grazing leases, and in some cases the land has been patented.

The country here and along the entire route is practically the same, consisting of undulating or rolling prairie with heavy clay soils with a few inches of black loam on the surface. Camp was pitched on Milk river in township 2, range, 20. The water of the river is much better here, being only a few miles from fresh-water springs which feed it. The volume also is much greater. A large amount of the water of the river must be absorbed by the soil and evaporated before it reaches its outlet. The difference in the volume in range 20, and range 7, is very marked. Nearly the whole of townships 2 in ranges 19 and 20, was retraced and a large number of monuments were established to take the place of the old monuments which had entirely disappeared.

The work here was finished about the middle of September. I then proceeded westerly by wagon trail to township 1, range 27. This township is situated in the foothills of the Rocky mountains and is covered largely with pine, poplar and willow. It is suitable for mixed farming and cattle raising.

The soil is exceedingly rich consisting of six to twelve inches of black loam, with a clay subsoil, and is capable of producing large crops of vegetables. There is a bountiful supply of fresh water in the many streams, one of which is found on nearly every quarter section in the township. The altitude varies from 4,000 to 5,000 feet above sea-level. This is somewhat against the raising of cereals as there is danger of summer frosts. However, there are some farmers in the vicinity who seem to be prosperous.

There are many well-known wagon trails, leading into the township from all directions which have been opened by settlers for hauling timber, large quantities of which existed a few years ago. It has however been destroyed at intervals by fire, and that which remains consists chiefly of second-growth and dead pine. A few speckled trout can be found in the streams. Deer, rabbits and grouse are also present. After completing the subdivision of this township I moved to the Waterton lakes, having made arrangements with the Commissioner of Dominion Parks to meet me there. It was his wish to look over the ground, before the survey of villa lots was commenced.

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Unfortunately he was unavoidably detained upon other business and was unable to meet me on my arrival on October 23.

In the meantime I proceeded with the retracement of a few miles in township 2, range 27 and township 1, range 30. The commissioner arrived on November 6, and after consulting with him while going over the ground, I began by making traverses of those portions of the lakes where it was decided to survey villa lots.

The commissioner selected what he considered to be the best sites. The sites selected are those which have been chosen by campers and pleasure seekers during the last few years.

There are, however, long stretches on the east sides of the upper and lower lakes, and on the south side of the middle lake which were not considered nor visited on account of the rugged nature of the country which gives no easy means of access.

After making a plot of the traverse, I surveyed the lots in a manner best suited to the requirements of a summer resort, it being desirable that the lots front on the lake.

The locality is entirely within the Waterton Lakes park and consists partly of open country, and partly of forest, with mountains from 2,000 to 3,000 feet high surrounding the lake.

The park at present comprises the east half of township 1, range 30, the west half of township 1, range 29, the southeast quarter of township 2, range 30, and the southwest quarter of township 2, range 29, west of the fourth meridian, a total area of fifty-four square miles.

There is no other locality in western Canada, which I have seen or heard of, which can compare with the Waterton lakes as a summer resort, there being a rare combination of climate, mountain scenery, large bodies of fresh water and trout fishing. Trout have been taken from these lakes recently weighing fifty pounds. The lakes are one and a quarter, two and a half and eight miles respectively in length, and from one-half to three-quarters of a mile wide. The upper lake is the longest and extends about four miles into the United States, the international boundary cutting it into nearly equal parts. The lakes have been sounded in many places and have been found to be about 300 feet deep. The water remains perfectly clear at all times, notwithstanding its being frequently lashed into foam by the hurricanes which blow down the pass almost continuously for nine months in the year, June, July and August being the only calm months. The lakes can be reached by many well-known wagon trails, which converge from all directions, leading from all the towns and villages in southern Alberta.

It was reported that about 3,000 people spent their vacations here during the summer of 1910.

After completing this work I left for the town of Pincher Creek where I arrived on December 15.

My work at this town consisted of a further subdivision of the southwest quarter of section 23, township 6, range 30, west of the fourth meridian. The survey is very regular and in a desirable part of the town which should make the lots attractive. This was the last work, operations being closed for the season on January 4, 1911.

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APPENDIX No. 38.

REPORT OF THOS. H. PLUNKETT, D.L.S.

SURVEY OF FRUIT LANDS IN KAMLOOPS DISTRICT, BRITISH COLUMBIA.

OTTAWA, January 4, 1911.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I beg to submit the following report on my surveys during the past season in the railway belt of British Columbia.

In accordance with your instructions, I left Toronto on April 3, 1910, and proceeded to Kamloops, B.C. A few days were spent in repairing my outfit and organizing my party, after which on the 13th, we left for Notch Hill, where by launch we crossed Shuswap lake and camped in township 23, range 10, west of the sixth meridian.

Our work here consisted of the survey of suitable fruit lands in township 23, ranges 10 and 11. We found a large area of good agricultural land in township 23, range 10, lying along the northerly shore of Shuswap lake, and extending back an average distance of about three miles from the water. This land lies on two main benches. The lower with an average breadth of about a quarter of a mile, extends almost the entire width of the township, attaining at section 11 a width of about half a mile and narrowing gradually toward the eastern edge of the township, while at the western edge this bench entirely disappears.

Along the northerly limit of this bench there is a somewhat steep rise reaching at the western limit of the township an elevation of about 1000 feet above Shuswap lake but rapidly becoming lower and of a much more gradual slope as its summit is traced easterly through the township. At the northeast corner of section 9 this rise attains an elevation of only 212 feet, with a slope so gradual as to permit of farming operations, and continues approximately at this elevation and slope to the eastern limit of the township, except in the westerly portion of section 10, where for a short distance it becomes rocky and precipitous.

North of the summit of this rise, lying on a gradual southern slope, is the larger and by far the more fertile of the two benches. It has an average width of about two and a half miles north and south, and extends the full width of the township east and west. This bench extends northerly to the base of the mountains, which rising somewhat precipitously, render agriculture impossible any farther north.

Portions of the lower bench are naturally somewhat gravelly, lying so close to the lake, but in the south half of section 9 and in sections 11 and 13 some rich brown loam was found well adapted to fruit or general farming. Just below this bench in section 11 there is a limited area of bottom-land of a very rich brown or black loam.

On the upper bench, the conditions for agriculture are very favourable. The soil in sections 15, 16 and 17, and in the south halves of sections 21, 22 and 23, is for the most part a rich black loam with a gravel or gravelly clay subsoil. The remaining portions of the bench have a brownish loam soil with the same gravelly clay subsoil.

This district is of course a bush country. West of the east boundaries of sections 9, 16 and 21 the timber consists principally of fir, cedar and hemlock from one to two feet in diameter. In addition to these varieties, spruce, birch and poplar up to eighteen

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inches in diameter are very plentiful. The undergrowth in this portion of the township is very dense, consisting of alder and willow brush with scrub maple; clearing is a very slow process. The fact that there are very few meadows where cheap fodder can be obtained renders it out of the question for the settler to provide himself with horses, and most of the clearing until now has been done by manual labour. In one or two cases where horses had been employed, the cost of their feed at prices in British Columbia, has compelled the settler to dispose of them. Although slow, progress in this district is nevertheless steady, and gradually the settler, convinced of the fertility of the soil, is carving out of the bush a comfortable home, and finding to his great satisfaction that a very small portion of land, probably from ten to twenty acres, when cleared and looked after properly, will afford him and his family a good living.

East of the east boundaries of sections 9, 16 and 21 clearing is very much more easily done. There is in this portion a much larger proportion of poplar, small spruce and fir. On almost every homestead in this section of the township there can be found from five to ten acres that can be easily cleared and very rapidly made to produce a living for the occupants of the land.

Agriculture in this locality is as yet in its infancy, but sufficient has been done to show the fertility of the soil. Vegetables of all varieties are being raised successfully. Small fruits yield abundantly, and the appearance of the fruit is excellent. Mr. H. A. Fowler's ranch in section 18, Mr. Blake's in section 11 and Mr. Beguelin's in section 16 demonstrate convincingly what the land in this township in general will produce. In addition to these there are several farms scattered well over the township in a more or less flourishing condition. Fruit raising has as yet not had time to develop, but almost without exception the settlers have planted small orchards which, although young, appear to be in a remarkably healthy condition, presaging the future development of the country along this line.

In township 23, range 11, we found a small portion of good farming land lying along the valley of Meadow creek, and extending northwesterly through sections 13, 23 and 24 to the valley of Scotch creek. The bottom-lands are narrow, but the side slopes and lower benches can be utilized to some extent. Several fairly large meadows are found in these sections.

The soil consists of sandy loam with a clay subsoil.

The bottom-lands are heavily timbered with fir cedar and hemlock up to four feet in diameter, but the slopes and benches are covered with small fir, spruce, poplar and birch of no commercial value.

This land is elevated from 500 to 700 feet above Shuswap lake, and judging from the flourishing condition of Mr. Fowler's ranch adjoining, it has a bright future as an agricultural district.

The climatic conditions in these districts are well adapted to fruit or mixed farming. Summer frosts are sometimes experienced. A severe frost this season on the night of August 23, affected this district in common with nearly all portions of British Columbia, but from what information I could obtain this was very exceptional. As development goes on it can, I think, be safely assumed that the danger of summer frosts will be entirely eliminated. It is the practice in this district at present to delay the planting of potatoes and the more tender crops until the beginning of July, it having been found that the rapid growth during July and August causes the crops to develop so rapidly as to equal crops where seeding has been done earlier, and thus the danger of destruction by frost is eliminated.

With the removal of the forest growth, irrigation during some seasons will probably become necessary, as this district lies so close to the dry belt. However, in this respect, this locality is favoured by having excellent facilities for irrigation. Manson and Meadow creeks supply ample water, easily available. In addition, Manson creek presents several splendid water-powers.

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Until recently, the settlers in the above-described districts have had difficulty in disposing to advantage of their farm produce, but of late, a regular weekly boat service has been established on Thompson river and Shuswap lake between Kamloops and Salmon Arm. These boats stop on signal anywhere along the shore of the lake to take on passengers or freight. The owners also supply the settlers with winter work cutting cord-wood and piling it on the lake front where the boat replenishes her fuel supply or carries the wood to markets along the lake. Several merchants from towns along the Canadian Pacific railway on the south side of Shuswap lake are now contemplating a gasoline launch service to trade with the settlers. At least one of these boats owned by W. J. Smith of Notch Hill, is in commission, and two others, I understand, are to be put on in the coming spring.

Game, including deer, bears and lynx, is plentiful in this neighbourhood. The mountains to the north are a favorite resort in the fall for hunting parties in quest of big game.

Having completed our work in this locality, we moved to Adams lake, where in addition to some traversing on the lake we subdivided some land in sections 17, 18 and 19 of township 23, range 12, and sections 24, 25 and 26 of range 13.

The land in these sections adapted to agriculture is very limited. The mountain slopes in general are too steep to permit of farming operations. Occasionally small benches of good land were encountered, and these, with the somewhat narrow strip of land between the edge of the water and the foot of the mountain, provide the only land where farming can be carried on. I do not think that much activity in farming will characterize this locality. Good grazing land, however, is found on all sides, and cattle raising might flourish if sufficient hay land can be located to provide winter feed.

Fish are plentiful in Adams lake, and game, including bears, deer and lynx is to be found on the mountainsides.

Climatic conditions are favourable to agriculture. Summer frosts do occur, but are not generally of a very severe character.

Irrigation will probably be necessary but ample water can be found in almost all localities where it is required.

From Adams lake, we moved to the northerly end of Niskonlith lake in township 21, range 13, west of the sixth meridian.

In the immediate vicinity of Niskonlith lake, namely in sections 6, 7, 17 and 20 we found very little good land, except in sections 6 and 7 where there is a limited area of agricultural land.

The timber in this locality consists almost entirely of bull pine and fir, from one to two feet in diameter, with, in sections 6 and 7, some poplar and willow. The land in sections 17 and 20 and portions of 6 and 7 lies on a somewhat steep slope, which however, provides excellent bunch-grass. In the east halves of the southwest quarter of section 7, and the northwest quarter of section 6, some first-class agricultural land was found, but only to a limited extent. Irrigation too is necessary, and the source of water supply for it is not evident.

North of the lake, however, along the valley of Loakin creek we found a considerable area of first-class farming land.

Our work this season, north of the lake, included surveys in sections 29, 32 and 33 of township 21, range 13, and sections 4 and 9 of township 22, range 13, but if time had permitted these surveys could have been extended into sections 16, 21, 22 and 15 where excellent farming land exists.

Loakin creek appears to have its source in a chain of small lakes, lying about the southwest corner of section 22. If on the removal of the bush, irrigation is found necessary, ample water could be obtained from these lakes and creek.

This land is elevated from 500 to 800 feet above Shuswap lake. The soil in the bottom-lands along the creek consists of a rich black loam, with a sand or gravel sub-

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soil, while farther back on the side slopes and benches the soil is a light loam, sometimes sandy with a gravelly clay or gravel subsoil.

This country is also covered with bush, fir, cedar, hemlock, pine, birch and spruce being the prevailing woods. Some fairly good patches of merchantable timber were found on the bottom-lands along the creek. This consisted chiefly of cedar. In the northwest quarter of section 4, and the southwest quarter of 9 some fine fir, spruce and cedar were found from twelve to thirty inches in diameter, so that clearing the land, while necessarily a slow process, will not present any special difficulty.

The climatic conditions render this an ideal farming and fruit raising district. Summer frosts are not severe enough to damage the crops, while in winter the district is favoured with a sufficiently heavy snowfall to protect young orchards.

Agriculture has been carried on for a number of years on the northeast quarter of section 20, township 21, range 13. Here gratifying success has been attained in strawberry culture, and a few apple, plum and cherry trees, probably about ten years old, produced excellent fruit this season, notwithstanding the fact that their condition shows neglect. If under the condition in which these few trees were found they can at least retain life, let alone bear fruit, no doubt under proper handling this locality will be found to be a profitable fruit country. Except this farm, no attempt at agriculture has as yet been made in this locality.

Our next work led us into Mabel lake country in townships 19 and 20, range 5, west of the sixth meridian, where in addition to the traverse of that portion of the lake lying within the railway belt, we planted posts along the lake convenient to suitable agricultural land, and subdivided portions of sections 26 and 27 of township 20, range 5.

This from a settlement standpoint is a new country. Lying adjacent to the Okanagan valley, twenty-five miles east of Enderby it is favoured with an ideal climate. Frosts are unknown in this district from May until November, and the rainfall seems to be sufficient to render irrigation unnecessary. If, however, experience proves the contrary, sufficient water is easily available in every locality where farming can become established.

By far the largest areas of land adapted to agriculture lie in the Frog and Noisy creek valleys.

Extending up Frog creek from its mouth in section 27, a distance roughly estimated at from six to eight miles northeasterly, there lies a valley with an average width of about one mile admirably adapted to mixed or fruit farming.

The soil of the bottom-lands immediately along the creek is of a rich black loam, while that on either side is of a brownish loam with a sand or gravel subsoil.

The land is very heavily timbered with cedar from three to ten feet in diameter, resembling very much the country on the lower Columbia river below Revelstoke. The cedar from three to five feet in diameter is generally sound, and easily handled by driving it down Frog creek and rafting it through Mabel lake to Shuswap river, down which it is taken to the mills at Enderby.

Considerable difficulty was experienced in making the surveys in this locality, owing to the fact that the beaver have dammed the country along the valley, flooding it for miles up Frog creek. Wading these meadows or rather lakes, in November, is work to which the axemen do not take kindly, and it was found advisable after having subdivided a few quarter sections, to abandon the work for this season.

At Noisy creek no subdivision surveys were made, but examination showed that a considerable area of good land lies in the neighbourhood of sections 17 and 20.

Some good bench land is also to be found in section 30 of township 19, range 5.

Deer, bears and caribou are very plentiful in this district. Beaver are very numerous, and marten and mink are also to be found.

A fairly good wagon road leads from Enderby to Mabel lake, while the lake permits of navigation throughout its entire length. Along this road the intending set-

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ter has convincing proof in the flourishing fruit orchards and farms of what can be done in the locality. No portion of British Columbia can boast of better produce. Conditions here should lead to the early settlement of this land.

This completed our fruit land surveys, and from here we went to Ashcroft and thence up the Cariboo road, where several small surveys occupied us for the remainder of the season.

The attention of ranchers in this locality is taken up mainly with hay and cattle raising. Potatoes and other root crops are successfully raised, the former in large quantities.

Irrigation here is imperative, and very little agricultural land remains where water is available.

The only new country visited was in sections 24, 25, 26 and 35, of township 23, range 25, west of the sixth meridian along the valleys of Scottie creek and its tributaries. Considerable good level land was found in this district, and our surveys could have been greatly extended if a solution of the irrigation problem had been evident.

Small portions of sections 25, 26 and 24 can be easily irrigated, and these were surveyed. It is doubtful if the remaining areas of suitable land are sufficiently extensive to warrant the expense which would have to be incurred to provide water for irrigation.

Surrounding the above-mentioned land are large areas of excellent grazing lands, very convenient to permanent water courses, which provide sufficient water at all seasons for cattle.

We finished our work here on December 15, and concluding that the season was too far advanced to undertake any further work, left for Kamloops where the party was paid off and our survey outfit stored for the winter.

I have the honour to be, Sir,

Your obedient servant,

THOS. H. PLUNKETT, D.L.S.

APPENDIX No. 39.

ABSTRACT OF THE REPORT OF A. W. PONTON, D.L.S.

SURVEY OF PARTS OF THE FIFTH MERIDIAN AND TWENTY-EIGHTH AND TWENTY-NINTH BASES
WEST OF THE FIFTH MERIDIAN.

Having organized my party at Edmonton I left on June 4, 1909, and reached Athabaska Landing on the 16th. We got away by boat on June 24 and arrived at a point on the Athabaska, about four miles above Grand rapids, on the 25th.

On the 26th we began exploring and cutting a trail northwesterly towards Wabiskaw river. In this work we were greatly retarded by wet weather and the flooded condition of the creeks and swamps. Further delay was caused by the necessity of returning to Athabaska river for supplies. On August 9 we reached Prairie river on the Wabiskaw river trail, and on the 17th arrived at Chipewyan lake. With one man I then proceeded by canoe down Wabiskaw river to Fort Vermilion, while the rest of the party went by trail to the junction of Red river and Peace river. At Fort Vermilion supplies were loaded on a raft to be taken to Red river. When within about five miles of Red river, during an attempt at mooring, the raft accidentally went over the rapids and all the supplies were lost, together with the tripods of my two transits, my level tripod and level.

Leaving my assistants to cut trails and pack hay at certain points, I returned to Edmonton by way of Peace River Crossing, Lesser Slave lake and Athabaska Landing, arriving there on October 9. I left Edmonton with other instruments on October 26 and at Athabaska Landing met my packer, whom I had instructed to return with the horses.

We proceeded by Wabiskaw across country and reached the starting-point of our surveys on December 1. The work was carried on without intermission until July 7, 1910.

By that time we had produced the fifth meridian from township 107 to township 112, had projected the twenty-ninth base across range 1 and the twenty-eighth base across ranges 1 to 17 inclusive. On July 8, we began mounding back over the lines run in 1908 and 1909 and continued until August 8. A great part of the mounding could not be done owing to the flooded condition of the country. We then closed operations and the party arrived back at Athabaska Landing September 13.

Township 107 along the meridian is generally suitable for agriculture, but townships 108, 109 and 110 are low and swampy. A chain of meadows extends across from east to west through the four townships. They are capable of producing an enormous supply of hay. Stunted spruce and tamarack are found scattered in the swamps. Township 111 is in the valley of Peace river and appears subject to flooding to a depth of 10 feet. There is much valuable spruce timber here and logs and manufactured timber can be easily got out. Some pine occurs on sandy ridges in the south half of township 112 but the north half is low and swampy.

Along the twenty-eight base between range 1 and the middle of range 3 the land is low and swampy, with occasional narrow sandy ridges, and is unfit for agriculture. But many hay meadows occur, and there is some small spruce, tamarack and jackpine. Fox lake surrounded by extensive meadows, lies in the west of range 3. The land surrounding this lake is good and well drained, covered chiefly with poplar suitable for pulp-wood. Ranges 4 and 5 south of Peace river contain good agricultural lands, but range 5 north of the river is low and wet. Range 6 is high upland with poplar

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and spruce brush, the soil having vegetable mould and fine sand with clay subsoil. Range 7 being level will require drainage before it will be fit for agriculture. In range 8 extensive grassy swamps occur, but range 9 is undulating and well drained, having a soil of from three to six inches of black mould with clay subsoil. The timber in these two ranges is poplar and spruce from four to ten inches. Range 10 is undulating but cut up by the valley of a creek. The bank of Peace river is fifty feet high. The soil is good and the timber large comprising spruce, poplar and cottonwood. Range 11 is mostly prairie, but range 12 is again cut up by Peace river. Good agricultural land lies both north and south of the river. From ranges 13 to 17 the country is level. Numerous marshes and muskegs occur and the water is strongly alkaline. The timber is chiefly small poplar.

The summer season in this district was unfavourable to the early maturing of grain, but not more unfavourable than in southern Alberta where it is hot and dry. The rainfall is ample but summer frosts are frequent.

The Cariboo mountains, north of the twenty-ninth base, seem to be eruptive in nature and there is a prospect that valuable minerals may be located there. The exploration, however, is extremely difficult owing to the lack of feed in summer and fuel in winter.

Good water is plentiful as far west as range 13, but farther west is strongly alkaline.

A power site second to few on this continent occurs at the chutes of Vermilion falls. There is another site at the confluence of Red river and Peace river. Here a head of twenty-five feet could be obtained.

Devonian limestone rock occurs in situ on the Peace river between Red river and Vermilion falls. Many of the bedded masses of this stone will make good material for masonry work.

Fish are not plentiful in this district and the Indians do not depend on them for food. Bears were plentiful and moose fairly numerous. Ducks were found in large numbers in all the ponds and lakes. Prairie-chickens and partridges were not very numerous.

APPENDIX No. 40.

ABSTRACT OF THE REPORT OF E. W. ROBINSON, D.L.S.

SURVEY OF PART OF THE PRINCIPAL MERIDIAN AND OF PARTS OF THE EIGHTH BASE EAST AND THE NINTH BASE WEST OF THE PRINCIPAL MERIDIAN.

Upon receiving your instructions dated February 24, 1910, I obtained all the information possible as to the nature of the country in which I was to work, and concluded that packhorses would be the best mode of transportation. I arrived at Winnipeg on May 2 and soon discovered that it would be impossible to procure ponies suitable for packhorses in Manitoba at anything like a reasonable price, and in view of the fact that other surveyors were experiencing difficulty in obtaining packhorses in the other prairie provinces, I decided to go at once to British Columbia where I knew I could buy without any delay as many horses as were necessary. I accordingly left Winnipeg and arrived at Vernon in the Okanagan valley on May 5. By the 7th, I had purchased twenty-three horses and on the 10th they were loaded on the car and shipped to Gimli in charge of a man I had hired to act as packer. I returned to Winnipeg to hire the men and buy my outfit and supplies, and left there for Gimli on May 18.

Gimli is a thriving little town on the shore of lake Winnipeg and is the present end of the railway. It is the market town for the Icelandic settlement in the immediate vicinity and a Galician and German settlement to the west. The fishing industry on lake Winnipeg has also assisted very materially the commercial progress of Gimli. Situated as it is on one of the few harbours on the west side of the lake, it forms a convenient base for the fishing in the central part of the lake. Unfortunately, too many of the settlers in this part of the country neglect the improvement of their farms preferring the immediate returns obtained from fishing to the slower but surer profits resulting from increased acreage under cultivation. Gimli has the advantage of an excellent supply of artesian water; in fact this can be obtained as far north as Icelandic river and possibly farther, but no wells have been drilled north of this point. It is necessary to put the wells down about ninety feet to tap the water-bearing strata, and the water rises from four to ten feet above the ground. The water, although somewhat hard, is suitable in every way for domestic purposes. Gimli is also becoming a summer resort for the people of Winnipeg and this will further assist in its progress. The horses arrived at Gimli on the evening of May 19 in poor condition after their long travel from Vernon. The two following days were occupied in arranging the outfit and on the 23rd a start was made. Owing to the horses not having been worked for some time, they had their own views about packing and a stampede occurred, which distributed my outfit near and far. Fortunately no serious damage was done, but it was the 25th before I could make another start. By this time the horses had submitted to the inevitable and no further trouble was experienced.

There is a wagon road running from Gimli to Fisher river which is in good condition, except after a heavy rainfall. Stopping houses are kept at convenient intervals along the road, although some of them are run only during the winter months, when there are many freighters bringing fish down from Fisher bay.

The party arrived at Fisher river and camped on the Indian reserve there. I had returned in the meantime to Winnipeg to hire some more men and arrange about further supplies. I travelled back by launch to Fisher bay on June 4. The land bordering Fisher river and occupied by the Indian reserve is a black loam on a clay

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subsoil. At this time of the year it was very wet, water and mud in every direction, in fact it was only by digging little drainage ditches that we could get a place dry enough to camp on. I was informed to my surprise, that it had been a drier spring than usual and I was accordingly thankful it was no worse. Fisher River Indian reserve has several stores and mail is received and despatched every two weeks.

The settlement is a well kept one and the inhabitants are prosperous, due in no small measure to the untiring efforts of the resident missionary, the Rev. F. B. Stevens, who labours to improve their temporal as well as their spiritual condition. Mr. Stevens has carried on agriculture for a few years and it has proved an unqualified success and the mission grounds furnish an excellent object-lesson of the productiveness of the country. The coarser grains all do well but wheat has not been given a sufficiently extended trial to demonstrate that this will ever make a wheat-growing district. Certain varieties of corn can be raised with success and in the autumn I obtained from the councillor at the Jackhead Indian reserve, situated about thirty miles north of Fisher river, three cobs of corn in which the grains were fully matured and well ripened. The natural grasses seem to be deficient in nutriment. Although my horses had very little work to do all summer they never seemed to thrive and as the fall approached they failed rapidly. I was told that cattle, fed in the winter with all the hay they can eat seem just to exist. Timothy has been tried and has proved a success and I am of the opinion that many other cultivated grasses would do as well. Although the summer was dry, the crops did not suffer as in the southern part of Manitoba and farther west. The first summer frost which came in the night of August 3 was sufficient to blacken the potato crop and this appears to happen most years. This is not to be wondered at, considering the vast extent of the surrounding muskegs, in some of which ice was found in the middle of summer. When the country is drained on a wholesale scale, as will be necessary to render the land available for agriculture and when clearing takes place these early summer frosts will probably disappear judging by the results obtained from similar operations in other sections of the country. All the usual vegetables thrive, such as potatoes, carrots, turnips, beets, peas and onions and Mr. Stevens' garden during August would prove a surprise to those not conversant with the possibilities of agriculture in northern Manitoba. Fisher river is from two to five chains wide at the mission and runs into Fisher bay.

I commenced the survey of the eighth base line east of the principal meridian after retracing the short portion already run. This line passes through the northern part of the Indian reserve and across a fine stretch of hay land belonging to it. Leaving the reserve there is muskeg and swamp land to the shore of Fisher bay with the exception of a narrow belt of poplar, spruce and birch growing on a natural dyke around the shore. Some two miles north on the shore of the lake is the small settlement of Fisher bay from which a large quantity of fish is shipped during the winter.

I sent the horses round by the south end of the bay to where the line meets the east shore and it was only after repeated attempts that they succeeded in reaching that point. There is a large area of muskeg and swamp extending to the south and southwest of Fisher bay. Apparently this bay at one time extended much farther to the south than at present but has gradually filled up, resulting in the present muskegs. Fisher bay is an arm of lake Winnipeg and is the scene of considerable activity during the winter fishing season. Pickerel, jackfish, goldeye, tullibee and whitefish are in the earlier part of the season caught in large numbers and shipped to Winnipeg. On the east side of Fisher bay there is a fringe of flooded land and then a ridge varying from five to twenty chains wide covered with spruce, tamarack and poplar up to ten inches in diameter. Between this ridge and the ridge along the shore of the main part of lake Winnipeg lies one immense muskeg, broken by one ridge with a general southeasterly trend, and which starts from Fisher bay at a point about five miles north of where the base line crosses. This ridge is timbered with spruce, tam-

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arack and poplar up to fourteen inches in diameter. There are numerous islands scattered throughout and these generally carry spruce and tamarack of small size. The muskegs vary in nature, some consisting of partially decayed moss to a great depth, some having a clay or hard-pan bottom at a depth of two or three feet, while others are floating bogs—a semi-liquid mass of decaying vegetable matter.

There is at present very little agricultural land of any value on this peninsula, and even if the country were drained it would take some years before these muskegs could be utilized. The district is a favourite hunting ground for moose. In some of the drier muskegs moose trails were crossed every twenty or thirty yards and it was no uncommon sight to see three or four of the animals in one day. Considering the noise made by the average survey party, this is sufficient evidence of their number. One fine buck moose stood on the line and gazed with undisguised astonishment at the instrument. I was unable to use horses across this peninsula, so I hired six men as packers. I finished this line on July 8 and commenced to move camp back to Fisher river where I arrived on the 11th.

I made enquiries there regarding the country north of Fisher river through which the principal meridian would pass and found that it would be possible to use pack-horses at least up to lake St. George, so I cut a pack-trail from the Indian reserve to the south end of this lake. The trail follows the ridges and crosses only a few swampy places, so that it would be passable at any season of the year. About seven miles from the reserve and again at eighteen miles from it we crossed some burned country where there was a good growth of pea-vine and this is the only good feed my horses obtained all summer. I moved camp by means of this trail and afterwards took a supply of provisions to the south end of lake St. George. The principal meridian starting at the eighth base line runs along a ridge with some fair spruce, tamarack and poplar but soon leaves this and enters muskeg, which continues until approaching lake St. George, where another ridge is encountered, on which is some excellent spruce, poplar, and small tamarack, together with a second growth of these and other varieties. The spruce, although scattered, is a fair size, some trees measuring twenty-six inches. This was the largest timber we met with in the season's work. I reached lake St. George on August 6 and found it shallow, especially at the southern end. The northern end is deeper but the light skiffs used in the country can navigate anywhere. The water is good and fish fairly plentiful. Goldeye can be obtained at all times and jackfish at certain seasons. I was informed that a stream, Jackhead river, flowed out of the north end of the lake to lake Winnipeg and I took advantage of this to send a large supply of provisions by a sailboat from Fisher river to the mouth of Jackhead river and thence up the river by skiffs to lake St. George and by Round river to Split lake, since renamed lake St. Patrick, where I made a cache. It was owing to my being able to do this and subsequently get provisions by water down Mantagao river to the ninth base line that I was able to practically complete the work outlined for the season.

On August 8, I attempted to commence the triangulation of lake St. George, my intention being to run a series of triangles up the lake in order to calculate the chainage, and on a very clear day to produce the line up. I soon found, however, that the task was almost hopeless. The shores of the lake, especially the south end, are marshy with high reeds and rushes growing thereon, and as the land bordering the lake is so very little higher than the lake itself, it was impossible to select triangulation stations which would be visible from one another. I, therefore, ran the adjoining section lines on the west side of the lake. This line is principally in muskeg and crosses two small lakes. I crossed east to the principal meridian, and, running north, came to lake St. Patrick, and, finding the condition of the shores the same as at lake St. George, had again to resort to running adjoining section lines. I reached the ninth base line on August 26 and running easterly to lake St. Patrick found that the intersection of the base line and the meridian fell in the lake. There is a ridge about ten chains

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wide lying along the west side of Lake St. Patrick carrying spruce, tamarack and poplar up to fourteen inches. As I knew the country through which the ninth base line would run to the west, I reduced my outfit to the smallest possible dimensions and again resorted to man-packing. The following is the method I adopted. The line gang would each carry a fairly light pack, say forty to forty-five pounds, to the end of the line and leaving them there, would proceed with their work. The other men during the day would bring up the supplies and the rest of the outfit and make camp, the line gang returning to that point at night. This was the daily routine and although the life was a strenuous one and totally devoid of the least suspicion of comfort it was the only method by which satisfactory progress could be made. My information about the country was correct: to all intents and purposes the whole country is a muskeg. There are narrow ridges running approximately north and south but they are only a few feet above the surrounding country and, as the soil appears to be very retentive of moisture, even these are usually wet. Moose are very plentiful here and as they are little hunted are easy to obtain. On September 7, I reached Mantagao river which at this point is a stream from five to ten chains wide and about fifteen feet deep, with a sluggish current. It rises in some muskegs to the south and pursuing a very meandering course flows into Sturgeon bay of lake Winnipeg. I was informed that there is a dry jackpine ridge extending all the way from Fisher river settlement up to Mantagao river, but I had no time to investigate the truth of this. I had previously sent my assistant back to lake St. Patrick to superintend the taking of some supplies by skiffs from my cache there around to Sturgeon bay and thence up Mantagao river.

Proceeding westerly along the ninth base line, we crossed the same class of country—muskegs separated by narrow ridges. .

On September 10, three inches of snow fell, but this all disappeared in two or three days. Frosts were of almost nightly occurrence. On September 16 we reached the marsh bordering lake St. Martin and procuring a boat from the Indian reserve to the south, proceeded to triangulate the lake. I found without much difficulty the end of the ninth base line already established on the west side of lake St. Martin, and triangulating to it, found the error of closing. On the west side of the lake the land is higher than on the east side and the soil is good. It was a welcome relief to walk on dry land after the months of never-ending muskegs.

According to instructions, I reran the ninth base line, distributing the closing error, back to lake St. Patrick and arrived there on October 11.

I then continued the production of the principal meridian to the north, although I found it necessary to run adjoining section lines until the north end of lake St. Patrick was reached and from there I was able to keep to the meridian. The country passed through is very similar to that described along the ninth base line and I used man-packing for camp transportation throughout. A heavy fall of snow occurred on October 22 and this remained on the ground making work even more disagreeable. We reached lake Winnipeg on the 26th.

I moved most of the outfit back, by means of a skiff, to lake St. George while the party returned by the line to lake St. Patrick. The weather was steadily getting colder and I was afraid of the lakes and creeks freezing up, so made the best possible speed. I arrived with the boat on lake St. George on the afternoon of the 29th and camped on an island. That night we had a severe frost and in the morning I found that lake St. George was frozen across. The party arrived at camp that afternoon having managed to cross the ice on lake St. Patrick with small loads. I waited several days hoping that the ice would become strong enough to enable us to bring the whole outfit down to the south end of lake St. George by means of hand toboggans. Snow, however, fell and the weather turning mild, I saw that it would be necessary to wait for some time and then get the outfit out by dog trains. We, therefore, proceeded to Fisher river where I endeavored to procure these. The fishing season on lake Win-

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nipeg had just begun and considerable difficulty was experienced in obtaining the necessary dog teams. I left my assistants to superintend the bringing of the outfit from lake St. Patrick while I proceeded to Gimli with the horses. I left Fisher river on November 14 and took the trail via Virdi and Ardal. This passes through better country than I had yet seen. The land is higher and the growth of grass good. A small town is starting at Ardal, being served by a branch railway line from Teulon. From Ardal I proceeded to Hnausa through a well-settled and prosperous community and eventually reached Gimli with the horses on November 18. My horses were in poor condition and, acting on instructions received, I arranged for their sale by auction at Winnipeg in the meantime feeding them well in the hope of realizing better prices.

I proceeded to Winnipeg and thence to Hudson Bay Junction to make arrangements for my winter's work. It was my intention to go to Thé Pas, but no trains were running north of Hudson Bay Junction owing to the line being blocked. I, therefore, returned to Winnipeg and thence to Gimli on December 1, where my assistants had arrived with my outfit from Fisher river. Having shipped this to Winnipeg for storage I left for Ottawa where I arrived December 7.

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APPENDIX No. 41.

ABSTRACT OF THE REPORT OF E. W. ROBINSON, D.L.S.

SURVEY OF PART OF THE SECOND MERIDIAN AND PART OF THE FIFTEENTH BASE WEST OF
THE PRINCIPAL MERIDIAN.

I left Ottawa on December 9, 1910 and arrived at Winnipeg on the 12th. I interviewed Messrs. Turnbull & Armstrong of the Hudson Bay railway as they had several survey parties working in the vicinity of The Pas and obtained from them some very valuable information. It was my original intention to use horses and toboggans for camp transportation and dog trains for bringing supplies from my base at The Pas to camp, but hearing that the muskegs were not yet frozen up owing to a heavy fall of snow early in the winter, I knew it would be impossible to use horses. I therefore decided to leave my horses in Winnipeg until such time as I could utilize them.

A discussion here of the relative cost and usefulness of the dog and horse for winter travel in the northland might possibly be of some help to other surveyors. Until recent years the horse was unknown in northern latitudes, the "husky" being employed exclusively for hauling. The husky probably originated by crossing the grey wolf with some domestic breed of dog, but it is now a distinct breed reproducing its kind with great fidelity. One has to go to the far north to obtain the real husky, all those in the valley of the Saskatchewan being mongrels. Owing to the demand for dogs in the last few years it is now somewhat difficult to obtain huskies or even mongrel huskies in any number, and one is compelled to resort to the domestic dog. Any of the larger varieties such as mastiff, Newfoundland, collie or shepherd make excellent toboggan dogs and with care will perform as much work as the mongrel husky. If trained carefully and this takes only a few days, they seem to enjoy hauling a heavy toboggan, in pleasing contrast to the husky who vents his displeasure in blood-curdling howls and fiendish snarls when being harnessed up. In fact the difficulty with most domestic dogs is to prevent them expending all their strength in the early part of the trip. If a stretch of exceptionally good trail is encountered they delight in tearing along at full gallop with a chorus of joyful barks. The first task of most Indian dog drivers with a train of huskies after harnessing them is to give each dog a severe thrashing with a loaded whip, with apparently the double object in view of impressing the dogs with a fear of their drivers and warming themselves up. Many writers of travels in the north have spoken of the cruelty with which these dogs are treated, and it certainly is heartrending to see, as I once did, a dog which after being worked until it dropped with exhaustion, unharnessed and with its eyes fast glazing in death, kicked off the trail with a curse. A toboggan train usually consists of four large dogs or five small ones, and the average load they can haul on a fairly good trail is four hundred pounds. The customary dog feed is fish, and dogs brought up on it seem to thrive well with an average daily ration of six pounds per dog. Contrary to what might be expected even in a country where the lakes abound with fish, it is not easy to procure enough for any number of dogs. Sometimes all the fish caught by the fishermen is contracted for by some dealer, in other cases owing to the migration of fish very few are caught, and Indians and half-breeds owing to their incurable laziness, rarely have enough for their own consumption. It is advisable therefore except on very long trips to take one's own dog feed.

Corn-meal and tallow and dog-biscuits are the substitutes and with domestic dogs are more suitable than fish for food. The corn-meal is first boiled for about

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half an hour and the tallow then added, the ration being two pounds of corn-meal and one-quarter of a pound of tallow per dog per day. The dog-biscuits are put up in boxes of twenty-five pounds each and are fed without soaking, two pounds per day being a full ration. The price of fish varies but an average price is three and a half or four cents per pound for whitefish at the fishing station. Inferior varieties such as jackfish, goldeye and sucker are cheaper, say two cents per pound, but these are not fed to working dogs when whitefish, tullibee or sturgeon are procurable. The wholesale price of corn-meal in Winnipeg is about three cents per pound and dog tallow eight cents per pound and of dog-biscuit seven and one-half cents per pound. Feeding on fish will therefore cost per dog about twenty-two cents per day, on corn-meal and tallow eight cents per day and on dog-biscuit fifteen cents per day. All these prices are exclusive of freight or transportation. As one travels north, the price of fish drops very rapidly, and where one is beyond the point where it can be profitably shipped to market, it is by far the cheapest dog feed. The general experience is that it costs more than eight cents per day to feed on corn-meal and tallow owing to the quantity wasted and it has the additional disadvantage of requiring cooking. As it is difficult to get men at the end of a day's trip to spend the time to properly boil the corn-meal it is usually insufficiently cooked and in this state is quite unsuitable for dog feed. Biscuits are always ready to feed and if any are not eaten they can be gathered up.

Some of the varieties of dog-biscuit on the market are carefully made and containing as they do, meat scraps, tallow and ground bone, form a balanced dog ration. I used dog-biscuits during the whole winter and found them most satisfactory.

Most of the dogs I had were domestic and they took at once to the biscuit and thrived well. It takes a little while to accustom huskies to the use of corn-meal and tallow or biscuits and it is better to start feeding them some fish as well.

Portability is an all important item and a dog train using corn-meal or biscuit can haul enough to last them three times as long as if they were fed on fish. If however, fish can be obtained at intermediate points this advantage disappears.

Opinions differ as to the best dimensions for a dog toboggan. Undoubtedly a narrow toboggan has many advantages, but for survey work where so much of the outfit is bulky rather than heavy, I am of the opinion that a fairly wide toboggan, say sixteen to eighteen inches, is the most suitable. This enables one to keep the load low down.

If one decides to use horses it is better to select the ordinary cayuse or Indian pony rather than a heavier horse. Certainly on a good hard trail a heavy horse shows to advantage, but if the trail is bad and the feed poor and scarce a cayuse would live where a larger horse would die; and these conditions generally prevail on survey work. An average ration for a pony on this kind of work is fifteen pounds of hay and fifteen pounds of oats per day. As the cost of these vary so much it is not possible to give a general figure for the cost per day. The hay should be baled in sizes to fit the toboggans. Although an experienced man can bind a surprising quantity of loose hay on a toboggan, it saves both time and hay to have it baled.

A horse toboggan should be twenty-four inches wide and about sixteen feet long. If any hills have to be descended, shafts are absolutely necessary, but in flat country and particularly along a crooked trail simple traces on a whiffle-tree seem to be the most satisfactory. There is, however, considerable divergence of opinion on this point. On the average bush trail made by the surveyor a pony will haul from six to eight hundred pounds, and when it becomes packed and well frozen twelve hundred can be taken with ease. The ponies stand the cold fairly well provided one keeps them sheltered from the wind and well covered with, say, two thicknesses of blanket and a canvas cover. They are better un-shod unless one has to cross lakes, or in the spring when the trails are sometimes icy. One man can look after one or even two horses

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each hauling from eight to twelve hundred pounds, whilst every dog train hauling from three to four hundred pounds must have a driver.

It is much easier to make trail for dogs than for horses. Two men can readily make in a day six to eight miles of trail for dogs through ordinary country, and if they use snowshoes and allow a day to elapse before travelling upon the trail, it will be hard enough to carry dogs without sinking. For horses a wider trail must be cut and it takes several trips with loaded toboggans and severe frost to make the trail hard enough to carry the horse without sinking. As one generally moves camp along a new trail, the progress is slow at the very time when rapidity is all important. Another point of importance is the crossing of a large lake or open place. After a few trips with the dogs across an open space the trail will be built-up, the light snow drifting in and each trip building it higher and higher until it is level with the surrounding snow. Subsequent winds cannot then block it up. With horse toboggans owing to the greater depth to which the toboggans sink and the plunging of the horses it is rarely possible to make a satisfactory trail across an open place and every trip a fresh trail has to be broken.

The surveyor has therefore many points to consider in making his decision as to which method of transportation to adopt—horses or dogs—and as the success of survey depends so largely on successful transportation, no trouble should be spared. In a few cases teams and sleighs can be used, but as surveyors are now being pushed farther into the northland and usually beyond any settlement, this is rarely the case, and the toboggan must be resorted to. Generally speaking if in a bush country, and if the trails made can be constantly used, horse transportation is cheaper than dogs, but in a partly open country and particularly on base line and meridian surveys, where one is constantly moving on, dogs will be found the most satisfactory. Even in the severest winters some rivers never freeze hard enough to carry horses while one can always find a place strong enough to carry dogs. Last winter some muskegs in the neighbourhood of The Pas did not freeze on account of the depth of snow and if I had used horses I should have been compelled to make wide detours with my trails. It might sometimes be advisable to use both horses and dogs; establish a main depot at some suitable point and have horses bring supplies there from the base of supplies and then use dogs for camp transportation or *vice versa*, the object being to avoid having to carry horse or dog feed farther than necessary.

I left Winnipeg on December 19, by the Canadian Northern railway with my outfit and men, arriving at The Pas on the afternoon of the 20th. I had previously sent my assistant there to make inquiries as to the available supply of dogs, and he reported that there were very few to be had, and those were small; also an exorbitant price was asked, viz., twenty to thirty dollars per head. Mr. E. N. Joyal offered to supply me with six dog trains complete and undertake my transportation, and this I accepted. A little time elapsed before he reported at camp with the dog trains but during the winter he performed his services with considerable satisfaction and relieved me of many details of transportation. I left The Pas on December 26, having been delayed there by the non-arrival of my freight. I travelled by team and sleigh to Birch river at which point I had to send the horses back owing to the unsafe condition of the ice. From here I moved across Birch river Indian reserve to my starting-point on the second meridian by means of hand toboggans, a slow and laborious task. Without much difficulty I found the iron post left on the south bank of Saskatchewan river. We passed little land of present agricultural value between The Pas and my starting-point. Along the river there is a strip of dry land from ten to forty chains wide, and also along Birch river one can find some dry land where tillable crops could be raised. The remainder of the country is of a swampy nature which would need draining on a wholesale plan to render it fit for agriculture. Hay can be cut around the edges of some of the marshes. It was reported to me that in some seasons of extreme high water the whole country is flooded. I did not have many opportunities

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for examining the soil owing to the depth of snow, but in most cases I found a rich black muck which would prove very fertile if drained. North of Saskatchewan river along the second meridian the country continues to be swampy with willow and alder growing thereon. Tearing river which we crossed is a rapid stream carrying the waters of Cumberland and Namew lakes into the Saskatchewan. At certain times of the year this river provides excellent sturgeon fishing.

Arriving at the north boundary of township 56, I started the survey of the fifteenth base line eastward. In sections 34, 35 and 36 range 31, I crossed a belt of spruce and tamarack from four to six inches in diameter. This strip of timber stretches in a northwesterly direction and contains a considerable quantity suitable for pulp wood. Through range 30 the base line is in a marshy country drained by small sluggish creeks. To the north lies Barrier lake a shallow lake or more truly a marsh. Saskatchewan river was crossed in section 36 and along its banks is a dense growth of grey willow with black and white poplar up to twelve inches in places. Through range 29 the Saskatchewan was crossed twice, the country being still of a marshy nature with a rich black muck soil. On the south side of the Saskatchewan lies Saskeram lake. This is more truly a large marsh containing some small lakes connected by sluggish creeks. Several small islands exist covered with spruce, tamarack, poplar and birch up to ten inches. The main winter dog trail between The Pas and Cumberland House crosses this lake. The base line again crosses Saskatchewan river in section 33, range 27; the banks are covered with willow, alder and white and black poplar up to fourteen inches in places. At ten chains from the left bank of the river the line enters the south end of Reader lake which is shallow, about six miles across and six miles long. Stretching along the east bank of Reader lake is a rocky ridge covered with jackpine and scattered birch, spruce and tamarack up to twelve inches. All this ridge is included in Indian reserve No. 21. Small patches of good land exist and some of these are being utilized by the Indians as gardens. A wagon road starting from the north bank of the Saskatchewan opposite The Pas runs along this ridge as far as Atikameg lake. In the winter this road is used for bringing the fish down from Atikameg lake where they are caught in large quantities. Leaving this ridge the line enters a spruce and tamarack muskeg crossed by a few small ridges until in section 34, range 26, a prominent ridge about a mile in width is encountered covered with spruce, tamarack, jackpine and poplar up to six inches. Along this ridge is the located line of the Hudson Bay railway. To the east there is a large expanse of swamp and muskeg about twelve miles in width. Small lakes and some sluggish streams occur at intervals.

A growth of willow generally covers the country, with some small spruce and tamarack along some of the creeks. In ordinary seasons hay can be cut around some of the marshes. In section 36, range 24, there is a ridge from half a mile to one mile in width timbered with spruce, tamarack, poplar, birch and jackpine, averaging eight inches. This ridge has a general northwesterly and southeasterly trend and the timber is sound and would make good milling timber. On the east side of this ridge one again enters swamp and muskeg some ten miles across and of a similar nature to that on the west side of the ridge. On the east side of this swamp on the shore of Moose lake there is some high land. Here we found a small quantity of spruce, tamarack, poplar and jackpine up to six inches and the soil was a sandy loam with considerable rock. Moose lake is a deep water lake of large expanse and is one of the principal fishing grounds in this part of the country. Whitefish, jackfish and trout are caught in large numbers annually. I produced the line across a bay of this lake finishing on the east side of the first timbered point that projects from the south shore of the lake where it can be readily found when required.

I then commenced to move my camp and outfit back to the second meridian arriving there on March 3. My work at this time was somewhat delayed owing to the non-arrival of freight to be brought by the Canadian Northern railway to The Pas.

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We commenced work on the second meridian on March 6. The line passed through some willow swamp and then crossed the ridge along the south side of Belanger lake. This lake is deep and about two and one-half miles in length and two miles in width. The main winter trail from The Pas to Cumberland House crosses the northern end. North of the lake is some higher land carrying spruce, poplar, jackpine and tamarack up to ten inches with patches of brule. The soil is generally a sandy loam with considerable rock, but some strips of excellent clay loam soil were encountered. The country remains of this description until English narrows, a portion of Namew lake was reached. Namew lake which is connected by English narrows and Whitey narrows with Cumberland lake is deep and well stocked with trout, whitefish and jackfish of a large size. The second meridian runs through its entire length crossing some points projecting from the west side. The banks are generally well covered with spruce, tamarack, poplar and birch up to ten inches, some of it excellent milling timber. The northern shore of Namew lake was reached in section 24, township 61, and the land rose steadily from the lake shore. The timber increased in size until near the north boundary of section 36, township 61, where the spruce reached a diameter of thirty inches, with scattered birch, poplar, tamarack and jackpine up to twenty inches. The soil was a sandy loam with some surface rock. I reached the north boundary of township 61 on March 27, and decided to finish my season's operations here. There was every sign of an early spring, in fact the lakes were then covered with water. I reached The Pas on March 31, and paid off my party. This town, for some time a prominent Hudson Bay post, has made considerable strides during the last few years. It has a population now of about 400, and has five general stores, a doctor and a dentist, school, etc. A steel railway bridge across the Saskatchewan is now in course of construction to connect with the Hudson Bay railway at present being located. A branch line of the Canadian Northern railway enters the town and gives a semi-weekly train and mail service.

Owing to the lack of agricultural land in the immediate vicinity of The Pas, agriculture has not been carried on to any great extent. All the usual vegetables seem to thrive well and it is reported that they are not unduly troubled by summer frosts. Undoubtedly if the country were drained the climate would be considerably improved and I am of the opinion that it would make excellent wheat raising land. There is a considerable quantity of natural hay meadow, and consequently the raising of cultivated grass has not been necessary, but I was informed that timothy grows well.

APPENDIX No. 42.

ABSTRACT OF THE REPORT OF O. ROLFSON, D.L.S.

SURVEYS IN THE BRAZEAU DISTRICT, SOUTHWESTERN ALBERTA.

We left Edmonton on May 3, 1910, and proceeded by rail as far as Wolf Creek. Thence we followed the wagon road to Whitemud and the pack-trail southerly to Brazeau river, arriving at our destination in township 44, range 20, west of the fifth meridian exactly one month after leaving Edmonton.

The trail followed crosses McLeod river about a mile above the mouth of Embarras river, which it, in turn, crosses four miles farther on. To the east of Embarras river, near Whitemud, it branches off, one branch following the east fork of the river to the Pacific Pass coal mines on the Pembina, and the other following the west fork to the Yellowhead Pass Coal and Coke company's mines. Following the latter branch of the trail, we proceeded from the mines southwesterly to McLeod river, and thence mostly along the river-bottom to the divide between the McLeod and the Little Brazeau. Reaching the Little Brazeau we followed it to a point near a camping ground known as the 'graveyard,' from which a day's travel brought us to our field of work.

As far south as the divide between Pembina and Embarras rivers, the country is gently rolling with jackpine on the higher lands, and spruce or tamarack muskegs on the lower lands; some fairly level areas, however, are covered with poplar. The water in the rivers and streams is fresh and good.

Near this divide and east of the 'graveyard,' on Little Brazeau river, the country on both sides of the river has been burned over and is now covered with dead timber, windfall and young jackpine. Farther south it is much higher and rougher, and timbered with pine, spruce, and some fine tamarack and balsam, up to twenty-four inches in diameter. There are many meadows, from five to forty acres in extent which provide splendid feed for horses.

South of Little Brazeau, the mountains rise high and rugged, the long ranges running northwesterly and southeasterly, with deep valleys between. The high peaks projecting above timber-line make the scenery beautiful. Rivers and streams are numerous, the larger ones having steep cut banks.

Coal seams were noted in the cut banks of Brazeau river in townships 43 and 44, range 20, but no other minerals were found.

The country south of Little Brazeau river is not suited to farming, but some parts might make good ranching land when cleared, as feed in the meadows and on some of the hillsides is good.

The air is always clear and the heat never oppressive, while the nights are cool and summer frosts are frequent. On the morning of August 25, there was ten inches of snow, but by noon of the following day it had all disappeared.

Game is abundant, consisting of sheep, goats, bears, deer and elk, rabbits, mink, ermine, &c., in the vicinity of Brazeau river. Partridges are numerous in the fall and mountain trout abound in the rivers.

Returning at the close of the season, the party followed the trail down the Little Brazeau from the 'graveyard' for a distance of about ten miles, mostly along the river-bottom and thence through a long muskeg valley and over a low divide to the Pembina. They then proceeded along the Pembina to the forks, and thence up the Little Pembina to the Pacific Pass coal mines. From here the trail led over a high divide and down into the valley of the Embarras and northerly to meet the trail from Whitemud.

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APPENDIX No. 43.**REPORT OF JOSEPH E. ROSS, D.L.S.**

SURVEYS IN THE KAMLOOPS DISTRICT, BRITISH COLUMBIA.

KAMLOOPS, B.C., December 17, 1910.

E. DEVILLE, Esq., LL.D.,
Surveyor General,
Ottawa.

SIR,—I have the honour to submit the following report of my season's operations in the Kamloops district of the railway belt of British Columbia.

On April 8, I started from Kamloops for Monte creek and Ducks range, to define the north boundary of the Martin Mountain Forest reserve. The land to the north of this reserve has been all settled within the past few years and only a few of the poorest quarter sections remain unoccupied.

After completing this survey I moved to the Jamieson creek country, on the west of North Thompson river, to survey the sections immediately to the east of, and to locate the east boundary of, the Tranquille Forest reserve. This land is mostly open or openly wooded, and not very hilly. The soil is fairly good and if water were available for irrigation it would be well suited for farming. As it is, the extreme dryness has prevented the few settlers who have located here from meeting with success.

From here I moved to lac du Bois to begin the main work of the season, subdivisions in, and ties between the Tranquille, Copper creek, Criss creek and Deadman valleys. This was the largest continuous stretch of work I have had for some years, the work being usually composed of small scattered surveys.

The wagon road does not extend beyond lac du Bois so it was necessary to get a pack-train of six horses for transportation purposes. However there were generally good pack-trails throughout the country, and only on Criss creek was it necessary for us to clear out trails for our use.

The most promising farming land we saw during the season was in sections 1 and 11, township 22, range 20, west of the sixth meridian, on Tranquille river, where there is good soil, and water is available for irrigation. With the exception of this land, on which there are now three settlers, the Tranquille valley is narrow and rugged, with steep mountainsides 2,000 feet high and picturesque canyons. While the soil in the settled quarter sections is excellent and easily cleared, an occasional summer frost has each year killed the potatoes, and it seems very doubtful if the settlers will be able to raise them. At an elevation of 4,000 feet there is a plateau covered with dense bush, chiefly jackpine, and unsuitable for agricultural purposes.

The early advent of the Canadian Northern railway will be of great assistance to the settlers of Copper creek and Tranquille river if a siding is made at Copper creek. A road from there could be built at moderate cost up Copper creek and along the route of the present trail to Tranquille river.

After running ties to Copper creek and Kamloops lake from the Tranquille valley, I extended the survey up Copper creek and around the Red lake and Frog creek valley, in which there is no land suitable for settlement, on account of the dry climate and the impossibility of procuring water for irrigation. The land is suitable for grazing, and that is the best that can be said of it. One settler has located on a wild hay meadow in section 34, township 22, range 21, west of the sixth meridian.

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A tie was run to the existing surveys on Deadman river, crossing a canyon on Criss creek and a high ridge between Criss and Deadman valleys.

The work was carried northward to Criss creek valley and another tie run to the end of the old surveys in Deadman valley.

In the northeast quarter of section 36, township 23, range 21, west of the sixth meridian, the valley of Criss creek becomes wide and partly open and for five miles to the north limit of the railway belt, there is a good strip of arable land in the brushy meadows along the creek. Just outside of the 'belt' there is a wild hay meadow, 100 acres in extent. While the land along Criss creek is good, and would be excellent agricultural land if situated at a lower altitude, its height, 4,000 feet, with prevalent summer frosts, renders it unsuitable for general farming. It may be a good valley for hay growing and oats may be raised but no test has yet been made. For years this valley has been used by stockmen of the district as a grazing ground. The boundary of the 'belt' was run from Criss creek to Deadman river, crossing a plateau wooded with jackpine.

A wagon road ascending the hill from Tobacco flats, on Deadman river, leads across this plateau to a settlement recently formed by some settlers on the upper Deadman river, in the provincial lands. A road has been built by the settlers from there to another settlement on the upper Bonaparte, where it connects with a government road leading to Seventy-mile House on the Cariboo road. The road from Tobacco flats is steep and rough, with rocks and side slopes that make travel difficult, and at times dangerous. We thought that we had found the worst road in British Columbia, but we were undeceived on finding a branch leading from this road to Snahooshe (Deadman) lake, on which there was a descent of twenty-five chains at an angle of twenty-four degrees, with a sharp curve in the middle to add interest. For this descent a sled is used, a wagon being too difficult and dangerous to handle.

Deadman river is in a steep, rugged canyon. The 'belt' boundary crosses the valley at the north end of Mowich lake, over a mile south of Snahooshe, or Deadman lake, where a company which owns the land at Wallhachin (formerly Pennys) is building a big dam for the purpose of holding water in the lake. This company has spent a great deal of money procuring water for irrigating their property. From Deadman river, at the mouth of Criss creek they have built a large flume about eighteen miles in length, while they have also built flumes and ditches from Barnes creek. As a result of their efforts the old Penny ranch has become the thriving village of Wallhachin, a prospective fruit centre, with a population composed almost entirely of English people starting orchards which should, in a few years, be very productive.

Having completed work in the Criss and Deadman valleys I moved to the Summer range, south of Savona, and ran a tie between the existing surveys on Guichon and Barnes creeks. The land here, 4,000 feet above sea-level, is very similar to that on all the plateaus, rolling, wooded country, with occasional hay meadows.

Having completed this work I sent the packhorses to Monte Creek to be wintered, and we went to Ashcroft, moving by train from there to Kamloops.

The remainder of the season was spent on subdivision surveys to the south of Kamloops in townships 17, 18 and 19, range 18, west of the sixth meridian. This land is about 4,000 feet above sea-level, rolling and broken and thickly wooded with jackpine. Each year sees some venturesome settler discovering an anticipated 'Mecca' in a wild hay meadow deeper in the jackpine forests than other settlers have penetrated. Thus the demand comes each year for an extension of the surveys in this district. After one attempt at raising a crop on the high meadows the majority of these hopeful settlers quit in disgust. On November 23, I completed the work in these townships and returned to Kamloops, closing field operations for the season.

The year was exceptionally fine and dry, only one day being lost on account of rain. The summer was too dry for the farmers and crops were poor throughout the district. In July and August the country was covered with a pall of smoke from

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several bush fires, but no great damage was done to timber, the flames keeping to the jackpine plateaus.

Tranquille and Deadman rivers and Criss creek are well stocked with small trout. Deer and bears are quite plentiful in the districts visited, while coyotes are everywhere present, making the night hideous with their yelping.

On Criss and Guichon creeks beaver have built long series of dams, flooding many small meadows. In no part of the year's itinerary were the beneficial results of the 'close season' so strikingly evident as on Guichon creek, where we were fortunate enough to see the animals at work. They are marvellously tame, and took very little notice of our presence. However the surveyor whose lines are continually striking ponds and dams, with dense willow, rising out of a couple of feet of water, is apt to consider the renaissance of the beaver a doubtful blessing.

The Summer range, between Savona and Guichon creeks is one of the foremost duck-hunting grounds in British Columbia. On the numerous lakes, ducks and geese abound in the fall. Red lake is a favourite breeding ground for ducks.

A surveyor's report from British Columbia is incomplete without some reference to the mosquito pest. This year we were fortunate enough to avoid it, being in country where the nights are cool, and stagnant water scarce. On Copper creek we encountered swarms of black-flies, and endured two weeks of misery.

Of the 230 days in the field there were thirty-three Sundays, one day was lost through bad weather, nineteen in moving camp, while the remaining 177 days were occupied in running 172 miles of line and marking corners.

Mining men have for many years had their eyes on the Tranquille. Near its mouth a gold dredge was tried unsuccessfully. At the 'forks,' that is the junction of Tranquille river and Watching creek, some placer mining was done in the early days, but the ground has long lain idle. There is undoubtedly free gold there but up to the present it has not been found in paying quantities. Some prospectors were on the river this summer, and we heard rumours of wealth untold, and saw glowing advertisements of the prospective value of shares offered for sale, but the rumours remain unconfirmed.

At Copper creek and Criss creek we ran across mining claims. At the former a company built a concentrator several years ago, and did considerable development work on cinnabar properties, but nothing is now done except assessment work.

Only a few years ago this Pacific province based its hopes of future greatness on its vast mineral wealth, but the pay-streaks of the past have dwindled to nothingness, and the few substantial mines that now operate are mostly of low grade ore. There have been many small booms, towns of rough buildings and tents rising with startling rapidity, only to fade away to the realms of unpleasant memory. British Columbia at last realizes that minerals are not her great asset, that the fertile soil of her valleys, her forests of giant trees and her salubrious climate are more reliable, and productive of greater wealth.

While the farmers were in bad luck this year on account of the exceptionally dry summer, other businesses thrived. Ashcroft, the outfitting point of the Cariboo district was very active. The points of the northern interior, Fort George, Cariboo and Nechacco districts import their supplies through here. From Ashcroft automobiles, stages and wagons leave daily with passengers and freight for Soda creek, the foot of navigation on the upper Fraser river, 165 miles distant. The great rush to the north during the past season threw life into this usually quiet town. Accommodation was scarce, but Ashcroft strove to fulfil its duty to the itinerant throng, and prospered.

Savona, too, was busier this year than it has been since the days of 'construction.' The lumber mill there worked steadily, supplying material for the buildings and flumes incidental to the development of Wallachin. It is probable that in the near future the flats of the Deadman Creek Indian reserve, between Savona and Wallachin, will be the site of the largest fruit raising colony in British Columbia.

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Kamloops increases in size from year to year, and now contains a population of nearly 3,800. The spirit of optimism is here deep rooted, the coming of new railways is looked for with great expectation and realty speculators are busy. There is a good fruit and agriculture area contiguous to the town and its winter climate is one of the best in the Dominion, so optimism is justified.

Three or four years ago the fact that the country is drying up began to grow apparent; ponds that were in existence two years ago are now dry, while the flow of water in the creeks is gradually diminishing. The heavy snow in the hills, upon which the water supply of the district is dependent does not come as it used to. Unless a change comes soon and the snow falls deeper in the hills the district will be face to face with a serious problem.

In conclusion I wish to state that throughout the season the work progressed smoothly and there was very little time lost. Both the weather and the country in which we were working were favourable to progress.

I have the honour to be, Sir,

Your obedient servant,

JOS. E. ROSS, D.L.S.

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APPENDIX No. 44.

ABSTRACT OF THE REPORT OF A. SAINT CYR, D.L.S.

SURVEY OF PART OF THE THIRD MERIDIAN AND PART OF THE SEVENTEENTH BASE
WEST OF THE THIRD MERIDIAN.

During the winter six tons of supplies were forwarded with a great deal of difficulty to the north shore of Crean lake. We left Prince Albert May 3, and reached the third meridian on May 12. The line was produced from township 60 to the seventeenth base line, which was then projected westerly across ranges one to twelve inclusive.

East of the third meridian the country is rolling with a descent towards Montreal lake which is about six or eight miles distant. The soil is stony and in many places the surface is covered with windfall. Some large areas of poplar and birch, up to ten inches in diameter, were seen near the meridian but in the vicinity of Montreal lake the timber is small and scrubby. The western shore of the lake is low and swampy.

In township 61 the soil is light but improves towards the north; large boulders, however, are numerous. There is a little hay land and feed was scarce.

In townships 61 and 62 there are several lakes which abound with fish. They are drained by a small stream which flows through a narrow valley, between steep hills as far as its junction with Crean creek. From here to Montreal lake the valley becomes a series of flats, often swampy and covered with dense willow or coarse hay. The stream is navigable only a short distance beyond the third meridian.

Just south of the north boundary of township 60, a belt of spruce, eight to twenty inches, extends east to the stream above mentioned, and west across ranges 1 and 2. This area has never been burned over though fires have swept the district immediately to the north.

North of township 60, the country is hilly and this is followed by several miles of almost level surface, covered with scrub poplar, birch and jackpine.

Wehakwao (Swearing) lake is situated in townships 63 and 64, and is bordered by impassable bogs. The lake which is shallow and well stocked with whitefish and pike, covers an area of about twenty-five square miles and the distance between the opposite shores along the meridian is six miles. Two streams enter the lake from the west while the outlet is from the east shore southeasterly to Montreal lake.

West of the meridian the seventeenth base line crosses several miles of undulating land, alternating with burnt-over areas of willow, dense jackpine or tamarack swamp. A prominent landmark called 'Thunder hill' by the Indians, lies about two miles north of the base line in range 2. Its base is surrounded by muskegs which drain into a lake on the line in the same range. North of the hill are some hay meadows followed by stony land with little vegetation.

The north of township 65 is hilly with the tops of the hills covered with clumps of jackpine and poplar of large size. These blocks of timber taken together cover about half a square mile and average 22,000 feet B.M. to the acre.

In range 4, the country is partly open along the line and the land, being high and rolling, is suitable for grazing. Grass grows in profusion and there are many creeks of fresh water. In range 5, the soil is lighter. Many tamarack swamps occur in township 63, with trees from six to eighteen inches. North of the base line the country is rolling or hilly and dotted with lakes.

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Smoothstone lake lies in range 6. It extends from a mile south to about eleven miles north of the line, and has an area of ninety-five square miles. An island occurs in this lake with an area of nearly three square miles. This island is covered with poplar and spruce suitable for pulp-wood.

West of Smoothstone lake the country is undulating. A block of timber estimated to contain seven million feet B.M., stands about one mile and a half west of the shore and another block along the shore will give seven hundred and twenty thousand feet, B.M.

A lake covers about two-thirds of township 64, range 8. This lake is shallow and drains through a creek into Sled lake in township 63, ranges 9 and 10. The lake lies in the centre of a low and boggy district, the northern extremity of 'caribou muskog' which extends south to township 60.

High hills wooded with poplar, birch, jackpine, fir and spruce, rise in ranges 8 and 9, about two miles north of the base line. These hills extend north of Dore lake. Their southern slopes will produce two million feet of lumber.

On the north shore of Sled lake about six miles south of the base line some half-breeds took up land twelve years ago. They have comfortable houses and on the land they have cleared they grow all the ordinary vegetables, and some have raised oats and barley. The soil is a clay loam free from stones. They also own horses and cattle for which they procure feed from the hay meadows around the lake in township 64, range 8.

Good land was again seen in range 12, near Beaver river. Benches heavily timbered with large poplar and birch extend from eight miles south of the base line to three miles north of it. Beaver river is one hundred yards wide where it crosses the base line. This river is the only one in the country explored which is suitable for driving logs.

Moose, caribou and red deer roam at will in these districts and bears are quite common. I was frequently warned by the natives to beware of timber-wolves. Their tracks were frequently seen. The fur-bearing animals are coyotes, foxes, otter, mink and lynx. Prairie-chickens, partridges and ptarmigan were also seen.

The best varieties of fish caught are whitefish, tullibee, pickerel and pike. Carp are also plentiful.

Hay which I ordered to be put up during the summer near Sled lake, was not available at all; the hay in the vicinity had been retained by the Isle a la Crosse Fish company, and oats which I had ordered to be forwarded to Green lake had not been delivered. We were consequently forced to break camp on December 20. We returned to Green lake and travelled from there to Big river and thence to Prince Albert.

I returned to the third meridian later and made a tie survey to Montreal lake.

APPENDIX No. 45.

ABSTRACT OF THE REPORT OF B. J. SAUNDERS, D.L.S.

SURVEY OF PART OF THE NINETEENTH BASE LINE, WEST OF THE FOURTH MERIDIAN.

For this survey my supplies were sent in from Edmonton to Lloydminster via the Canadian Northern railway and thence by horse teams to a point about fifteen miles beyond the north end of Primrose lake, where a permanent cache was built. This work was done in February and March. From the cache a small portion of the supplies were pushed on by dog teams ten miles farther north to a point near the intersection of the base line with the fourth meridian, but this work had to be discontinued owing to the snow going off suddenly and early. It was important and necessary to get these supplies in at this time of the year as the country for about twenty-five or thirty miles south of the base is practically one mass of muskeg and nearly impassable in summer-time even for the packhorses. Two men were left in charge of the supplies to protect them from being looted and from fires, and at the same time to do some work in trail making between the cache and the line.

In June, I set to work to organize my party and get everything ready. Owing to the great demand for labour throughout the West last year in railroad construction and other work, I found great difficulty in engaging suitable men for the survey and had to take a number of inexperienced men, many of whom were comparatively new arrivals in Canada. Packhorses for use on the work beyond Cold lake were purchased in Calgary and brought up by rail to Edmonton and on July 12, a start was finally made.

The route taken from Edmonton was by trail via Fort Saskatchewan, Bruederheim, Wostok, Whitford Lake, Saddle Lake, St. Paul de Metis and Cold Lake Indian reserve to Beaver river where a day was spent getting everything ferried across. I was able to take teams and wagons loaded with additional supplies as far as the eighteenth base line to supplement what had been taken in during the winter. The packhorses were loaded lightly so as to save them for the actual work beyond the end of the wagon road. From the eighteenth base we travelled practically over the same trail which had been used by Mr. Wallace when surveying the fourth meridian in 1909. After about one week's tedious work, camp was pitched on a widening of Calder river near the beginning of the line, this being the only place where there was any semblance of grass for our horses. In six weeks time we had run only about eleven miles of line, so much time being required making and repairing trails to enable our horses to get along. It is no exaggeration to say that as many miles of corduroying were necessary in trail making, as there were miles of line run.

There being practically no feed for the horses along or close to the line, I concluded that the only thing to be done to push the survey along was to endeavour to get the line ahead to the Lac la Biche-McMurray dog trail, and to take in supplies by this route if possible. Reports were current that plenty of hay could be put up in the vicinity of Whitewood lake, which the line would probably intersect, or run close to in range 7 or 8. These reports I found to my sorrow to be misleading and untrue. Having returned to Edmonton in October for more supplies, I made the attempt to meet my men, or some of them, as definitely arranged before leaving camp, at Whitewood lake, but this proved unsuccessful after a most arduous trial in which two or three of my men, as well as myself, nearly perished by drowning and freezing. On New Year's day I returned to Lac la Biche and went in again via St. Paul and

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Cold lake and met my party coming out. Of the twenty horses left with them, only one was alive, the others having succumbed to the cold, starvation, and attacks of wolves.

The section of the country traversed by the nineteenth base line up to range 6, lies practically on the watershed of streams flowing easterly, southerly and northerly, and in consequence there are no streams of any size met with. Small muskeg lakes are quite numerous and muskeg is met with everywhere.

The timber consists of small spruce, tamarack and pitch-pine; only an occasional poplar was seen. Fires have no doubt swept the country periodically and as a result, the timber is small and scrubby and quite unfit for commercial purposes.

Where there is any soil it is poor, and in my opinion unsuitable for agricultural purposes.

Moose and caribou are very plentiful, as are also timber-wolves.

The weather was extremely cold in December and January, quite the severest I have ever experienced and snow lay three feet deep on the level.

Should it be decided to continue the survey of this line, it would be best to take in supplies via Lac la Biche in winter and cache them at points where the line would intersect the two dog trails leading from Lac la Biche to McMurray, and a trail running from Owl river to House river. Necessary supplies, if horses are used on the survey, should include plenty of hay and oats.

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APPENDIX No. 46.

ABSTRACT OF THE REPORT OF W. A. SCOTT, D.L.S.

MISCELLANEOUS SURVEYS IN SOUTHERN ALBERTA AND SASKATCHEWAN.

Upon receipt of instructions I left Pincher Creek on May 7, and on the 14th arrived at our first work in township 9, range 30, west of the fourth meridian.

On the completion of the work in connection with the Peigan timber limit in township 9, the party moved to township 10, and enclosed the block composed of sections 1 and 12. The work so far was in the Porcupine hills, a range 1,500 feet above the level of the prairie to the east. The summit runs almost due north and south slightly to the east of the fifth meridian. The hills are timbered with fir up to four and a half feet in diameter. On the whole, the east and south slopes of the ridges may be said to be bare or covered with small poplar, and the creeks in the valleys contain many open patches. The soil is a rich black loam with a light subsoil but owing to the hilly, wooded nature of the country and to frequent summer frosts, it is not suited for farming. It does however afford an excellent opportunity for ranching. There is much merchantable timber left in the hills although a great deal of the best of it has already been taken out. No difficulty is experienced in reaching almost any part of the Porcupine hills by wagon road, as there is one crossing the summit from east to west every few miles.

Our next work was the subdivision of part of township 11, range 2, west of the fifth meridian, which is easily reached by a good wagon road. The country here is very similar to that in the Porcupine hills but there is little heavy timber except on the tops of the ridges where there are a few scattered fir; the remaining timber is small poplar and willow. The valleys are open and afford good grazing for stock. Very little effort is here made to raise a large quantity of grain, the time of the people in this vicinity being devoted to the raising of stock.

On the completion of this work the party moved, on June 11, to the third base line to connect up three miles which crosses the summit of the Livingstone range. This was a rather difficult piece of work and as it could not be completed from one end, necessitated a two days' move, by wagon and pack-train, around through the Crowsnest pass to the other end of the three miles. The Livingstone range here is 2,500 feet above the level of the land to the east and marks the dividing line between hilly prairie to the east and a rough mountainous country to the west. The easterly slope of the range is more precipitous than the westerly slope.

We moved to township 10, range 4, going by a wagon road to the 'Gap' in the Livingstone range, thence up the valley of Racehorse creek four miles by wagon over a trail cut by ourselves, and the remaining distance of two miles, by pack-train. The atmosphere soon began to become very smoky on account of forest fires to the south. When the work for which I had instructions in this township was completed I considered it advisable to move camp to some point where the party could be moved from all danger of the fire in a short time, as the fire from the south had reached a point only six miles south of our camp, and there was a forest fire in township 12, range 4, to the north of us, which at that time was under control but which at any time might break out again. Two men from my party were assisting the Dominion Forest Fire Ranger at the northerly fire. I accordingly, on July 21, moved camp to the 'Gap' and completed the traverse of the North Fork of Oldman river. This traverse took three days and from the completion of the traverse until August 6, the entire party

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were fighting forest fires under the supervision of Dominion Forest Fire Ranger, Mr. Hart. At one time only, was any danger encountered when, due to a heavy wind and big timber, the fire suddenly increased in violence and camp had to be moved from the 'Gap' to a point of safety several miles east, outside of the Livingstone range. In this case the outfit was started only fifteen minutes in advance of the fire on account of having some difficulty in finding the horses which were two or three miles from camp. Various methods of fighting the forest fires were employed, but during the day when the wind freshened it was impossible to do anything.

On the evening of August 5, the rain started and continued all the following day; this effectually put an end to the fires. I considered it advisable to work outside of the mountains until such time as the grass in the burned area would have grown sufficiently to afford feed for the horses, so on August 8, I moved camp to township 10, range 1. The eastern half of this township is in the Porcupine hills and much of this part is covered with timber, poplar on the lower and fir on the higher hills. The western half is rolling prairie and is suitable for farming purposes, while the eastern half is suitable only for the grazing of stock. This township is readily accessible by good wagon roads.

On September 5, we moved back to township 12, range 4. Owing to a two days' snowstorm on the 6th and 7th work was not commenced until the 9th. It was found that the grass had grown sufficiently to afford feed for the horses but baled hay had to be supplied to the picket horse. Owing to the fire the production of lines was made easier than formerly as all underbush had been burned up, as well as the fallen timber of previous fires, which was so dense in this part. The timber previous to the fire was on the whole a dense growth of small second-growth jackpine. The westerly boundary of the burned area may be roughly said to be one mile east of the east boundary of range 5, and the northerly boundary one mile north of the fourth base line. The best timber in this section is in range 5. A fire in the mountains is a more serious setback to the country than a similar fire in a flat country. Where the fire burned furiously up hill or was fanned by a heavy breeze, everything was consumed. There is at best but little soil covering the rock and stones and this was entirely consumed, leaving nothing in these parts but dead charred poles still standing in their bed of stones, gravel, and ashes. Under these conditions it may be many years before vegetation will again obtain a hold on these hills.

There is a good wagon road from Cowley or Lundbreck as far as the 'Gap': here a bridge was burned out which makes the passage of a heavy load impossible without 'doubling up'. From the 'Gap' a wagon road follows the valley of the North Fork as far as section 11, township 12, range 3. Another wagon road branches from this road at the mouth of the northwest branch and follows the valley of this stream as far as section 9, township 12, range 4, at which point the deserted camp of the Great West Coal company is situated. There are numerous old Indian pack-trails following up the valley of almost every creek but they are only passable for an Indian and require to be cut out if they are to be used to any extent.

The general direction of all the ridges is north and south coinciding with the strike of the rocks. The tops of the ridges are usually bare rock of either grey or black shale, or a hard cherty conglomerate. The Livingstone range is an exception to this rule consisting of limestone or grey shale with limestone greatly in predominance. There is a large amount of coal in the hills, it being found immediately beneath the conglomerate. The dip of the rocks is towards the west and varies from 30 to 60 degrees. Outcrops of coal may be seen at the tops of most of the hills.

No doubt in the near future these coal areas will be made accessible by a railway.

The fall in the rivers I have estimated to be about fifty feet to the mile. Such a fall as this, combined with the nature of the country affords an unexcelled opportunity for the development of water-power.

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The work in township 11, range 4, was complete and work in township 12 in the same range was commenced. This was proceeded with until the end of October when I considered it advisable to bring in the party and start on miscellaneous correction surveys in Saskatchewan. The party was paid off in Pincher Creek on November 1.

After surveying the east boundaries of sections 29 and 32, township 13, range 2, west of the fifth meridian, I and my assistant took the train for Swift Current, Saskatchewan on November 11.

Work was commenced in township 16, range 13, west of the third meridian on November 14. I retraced the east boundaries of sections 3, 10, 15, 22, 27 and 34 and the north boundaries of sections 10 and 11 and reported that a resurvey of the entire township would be advisable.

I left Swift Current on November 19 for Froude and arrived there on the 21st. I drove to township 7, range 10, west of the second meridian and after chaining twelve miles of meridians, I reported that a resurvey of the entire township was necessary. On November 24, I left Froude and took the train for Zealandia arriving there on the following day. I drove to township 28, range 12, west of the third meridian and completed the subdivision of this township, establishing a new northerly boundary of Lake No. 1.

I left Zealandia for Quinton on December 1, arriving there the following day and drove to township 27, range 17, west of the second meridian to investigate the boundary of Mission lake in ranges 17 and 18. I found that the boundary was not shown correctly on the township map and I made a traverse of this lake. I returned to Quinton on December 7, and as the ground was covered with snow to a depth of eighteen inches I did not consider it advisable to continue work. I accordingly disbanded the party and left for home arriving at Galt on December 10.

APPENDIX No. 47.

ABSTRACT OF THE REPORT OF H. W. SELBY, D.L.S.

MISCELLANEOUS SURVEYS AT ATHABASKA LANDING AND McMURRAY.

The subdivision of lots at Athabaska Landing was completed on May 12. The surface of the part subdivided was timbered and the survey required more cutting than I had anticipated. The land is rough and stony, and the soil sandy and gravelly so that nothing but vegetables could be grown on it.

The weather during the survey was fine but bush fires in the vicinity rendered the atmosphere so smoky that it was difficult to secure an observation for azimuth.

On May 21, I left Athabaska Landing for McMurray where I made some settlement surveys. My party had gone on, May 16, by the regular Hudson's Bay company's transport, but I was detained by illness until the next transport left on May 21. I reached McMurray on June 8 and my assistant, who with the party arrived a few days before, had established camp and traversed a part of the shores of Athabaska and McMurray rivers. He had plotted the information gained so that when the Minister of the Interior arrived on the 9th the plan was of very material assistance in determining what surveys were to be performed.

The old Hudson's Bay company's fort, now abandoned except for a short period in winter, is picturesquely situated on a bench overlooking Athabaska river towards the north, and at the base of a range of hills 200 feet high. These hills are composed mainly of a substance known as tar sands overlying limestone and covered by a thick layer of clay soil. The surface is heavily covered with poplar and scattered spruce with much underbrush and vegetation. The flat on which the fort is situated extends southeasterly from the main river along the foot of the hills above described for a distance of two miles, where it is cut by Hanging Horse creek and McMurray river. It has a width of about three-quarters of a mile. The greater part is covered with a thick growth of poplar and willow, but there are several prairie openings caused no doubt by fire cleaning up the land from which the timber for the use of the fort and other houses which have been occupied from time to time had been cut. It is only some twenty years since the Hudson's Bay company began bringing their supplies for the north from Edmonton and down the Athabaska river. Formerly these were brought down from Winnipeg via the Saskatchewan and McMurray rivers. One can imagine that the large number of boats needed to carry these supplies in one trip over the many portages met with by that route, would require also a large crew of men, who, having reached the end of their troubles, would probably camp at McMurray, resting for several days, before starting on their long return trip up stream perhaps leaving large camp fires to spread. This, I say, going on for many years might account for the prairie openings found here and on the island but nowhere else for many miles around. Athabaska and McMurray rivers have cut a channel which leaves an island between the main branch of Athabaska river and the confluence of the other branch with the McMurray, and this channel, through which at high stages of water part of McMurray river discharges, forms the easterly boundary of this flat. Very little attempt has been made to grow any grain except in the vicinity of the fort and on the island. Wheat, oats and barley, besides all kinds of vegetables have been grown on the island, for at least thirty five years, and, I am told, without being damaged by frost. Upon this flat of land I found seventeen squatters. Having laid down on paper the area claimed by these squatters, I divided it into

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twenty-four lots and apportioned to each squatter his improvements and as much of the land as the lot lines would permit without encroaching upon the improvements of his neighbour. With the exception of about half a dozen who have been living here for some years and have habitable houses, and fenced gardens, these squatters have made very little attempt to improve their land. I think, probably, the cause for this was that until a survey was made, no one wished to improve a piece of ground he was not likely to get. Since the survey was made two have begun breaking and several are arranging to build better houses, and are sending for horses and implements to make improvements with. There is very little use for much grain growing until railroad transportation is established. As the quantity required is at present so small one ten-acre field would supply more than could be disposed of. It may be thought that the finding of petroleum, the mining of salt, tar sands, limestone and coal, together with the prospect of iron and copper in the vicinity, would encourage the development of the agricultural areas. This no doubt would be the case, but there is not the least chance for any of those industries being carried on until the facilities for importing machinery and supplies and exporting the minerals are improved to a great extent.

There is another feature that will influence the settlement of the country and that is the enormous areas of pulp-wood which are tributary to Athabaska river and which cannot be taken up-stream. This would be manufactured at some point either here or farther down the river where power could be readily developed. East of the mouth of Hanging Stone creek, along the banks of McMurray river, there is a flat from half a mile to a mile wide, heavily timbered with poplar and spruce,

At the request of those occupying lands on the base line, I laid out a road ninety-nine feet wide through the settlement which they desired in anticipation of the building up of a town of some importance should a railway be built into the settlement.

APPENDIX No. 48.

ABSTRACT OF THE REPORT OF D. A. SMITH, D.L.S.

SURVEYS IN THE RAILWAY BELT, BRITISH COLUMBIA.

We left Kamloops on May 29, 1910, and reached our first work which was in township 25, range 8, west of the sixth meridian, on the 31st.

The land surveyed in this district all lies within a few miles of Shuswap lake and is easily reached by boat from Sicamous. Launches and steamers run on Shuswap lake and will land passengers or freight wherever desired. Violent and sudden storms, however, render travelling by small craft dangerous.

Hunakwa lake is reached by portage from the head of Anstey Arm. The portage is about a mile long with good firm ground and very little climbing. In high water a small boat may be taken up Hunakwa creek but during the time of survey June, there was not enough water to float an empty canoe.

The survey was commenced from the northeast corner of section 27, township 25, range 8, a point established by Mr. J. E. Ross, D.L.S., and was carried by triangulation across to the east side of Seymour Arm, where all the work lay. From Seymour Arm the survey was carried as far east as was expedient and the remainder of the work in that district was completed from Anstey Arm and Hunakwa lake.

During the early part of the work and from the latter part of September to the middle of November, when we left Shuswap lake, there was scarcely a day without rain and frequently the rain lasted all day. The thick underbrush was always wet so that it was almost as disagreeable on a fine day as on a rainy one. During July, August and the early part of September, the weather was exceptionally good. Considerable time was necessarily lost in going to and from work, since much of the land surveyed lay at some distance from the shore, and owing to the rugged nature of the country it was a slow and difficult undertaking to pack a camp outfit to a convenient place.

The land rises generally from the shore of Shuswap lake from two to eight hundred feet, with steep rocky slopes of which very little is suited for agriculture. Back of this there is generally a gently rolling bench or series of benches extending to the foot of the mountains. At the north end of Anstey Arm is a level tract of land about a mile in width extending to Hunakwa lake; this lake is about three miles long and half a mile wide. There are numerous small creeks, Anstey creek being the largest. During high water it may be used for bringing down logs, and from its rapids and falls considerable power might be developed.

By far the most valuable of the resources is the lumber though much of this part has been swept by fires in recent years. Most of the valuable timber has already been disposed of, and, outside of the timber berths, the good timber is scattered and difficult to get out. No minerals of value have been discovered, but the country has not been thoroughly prospected. Fish are plentiful but they are more of a sporting than a financial asset. Game is scarce, a bear, a deer and a few grouse being all that were seen in the district though signs of bears and deer were frequently noticed.

So far no attempts at cultivation have been made with the exception of small gardens, indifferently cared for, but the results, considering the work done, were promising. A few miles to the north, the common varieties of garden produce have been tried with excellent results. At the head of Seymour Arm a large tract of land is being planted with fruit trees, but what success will attend this industry remains

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to be seen. Early frosts especially on the higher levels, is the greatest danger that threatens them. Irrigation is not considered necessary, and, judging from the past season, the rainfall is sufficient for all purposes. Small wild fruit grows abundantly wherever a chance is afforded and there is no doubt that all small fruits would yield well. The swamp land can be drained and used for grain, hay and garden produce.

The quality of the land is very variable. There is a great deal of land in the territory surveyed that is useless from an agricultural standpoint largely on account of the rock and steep slopes, but it was necessary to survey it to take in what was good. The prevailing soil is a sandy loam with a gravel or gravelly loam subsoil. The swamps are generally of rich black loam, at present wet but easily drained.

On the completion of the work in the Shuswap district I moved to township 25, range 20, west of the fifth meridian about fifteen miles southeast from Golden. This part is easily reached by a wagon road following up the Columbia valley from Golden to Fort Steele. The Kootenay Central railway is graded out about fifteen miles from Golden but only about a mile of track has been laid yet.

During the time we were working in this district, the trees were heavily laden with snow. This, with from one to two feet of snow on the ground made fair progress impossible. Most of the work lay on the bench land where there is a thick growth of trees, the more open land in the bottom having been previously surveyed. The snow in the bottom was about six or seven inches deep.

The land rises from the river-flat with a very gentle slope which extends back varying distances to the foot of the steep slope leading to the upper bench land. Most of this lower land is good and has already been taken up. The upper bench extends in a gentle slope or a series of benches to the steep rocky sides of the mountains. The steep slope leading from the lower to the upper bench land is useless for agricultural purposes. So far as soil is concerned much of the upper land is good. It is generally clay loam, sometimes with sandy or gravelly subsoil, and is suitable for grain or fruit.

In this township, there is some good timber, chiefly fir, but here as in the Shuswap district the best has been disposed of and what remains is very difficult to get out. No mineral discoveries have been made, at least no mines are at present being worked.

The township is intersected by numerous small creeks some of which are being used to irrigate the lower land and small areas of the upper land. Irrigation will have to depend almost entirely on the rainfall which I believe is not sufficient for requirements.

In the settled parts, a number of apple trees have been planted, but have not given satisfactory results, many of them having died. The apples that I saw, which were grown in the district, were small but of good quality. It is doubtful if the upper benches will be suitable for fruit owing to the early frosts. Small fruits of all kinds give very large returns and are easily grown. From experience it would seem that on these, rather than on apples, the settlers will have to depend. Alfalfa has been grown and yields well.

Game is scarce, nothing but grouse being seen, though brown bears and grizzlies, deer, sheep and goats are reported to be fairly plentiful on the higher lands. Nearly all fur-bearing animals are becoming scarce in the railway belt.

APPENDIX No. 49.

ABSTRACT OF THE REPORT OF L. D. N. STEWART, D.L.S.

SURVEYS IN THE KAMLOOPS DISTRICT IN THE RAILWAY BELT, BRITISH COLUMBIA.

After organizing my party at Kamloops we left on May 27 for township 23, range 9, west of the sixth meridian on the north shore of Shuswap lake. The land in this township rises somewhat abruptly from the lake except at the mouth of Ross creek where there is a flat of seven or eight hundred acres in sections 17 and 18.

The land in townships 22 and 23, ranges 9 and 10, where I worked is well adapted to fruit growing and mixed farming, being a sandy loam with a clay and gravelly subsoil. Several settlers are located on this part of the lake and some have orchards bearing fruit equal in quality to that of the Okanagan district. The climate is excellent being very similar to that of the Niagara peninsula of Ontario. There is plenty of rain in June; August and September are dry, while October, November and December are wet. There was a slight frost one night about the middle of August but this is unusual.

The water is excellent in both Shuswap lake and the tributaries, but the small streams usually become dry in August.

Shuswap lake abounds with fish of several varieties, the principal being grey, rainbow, dolly-varden and silver trout, while in autumn the salmon run up from the sea, frequently in immense quantities. Brook-trout are found in Ross creek.

Grouse are plentiful in the district and wild ducks are found on Shuswap lake in the fall. Black-tailed deer are plentiful and caribou are found on the higher elevations.

Shuswap lake seldom freezes over and steamers run all winter. During the winter of 1910-11 there was a tri-weekly service from Sicamous to the head of Seymour arm.

There is a wagon road from Notch Hill to Archie Redman's on section 30, township 22, range 10, which could be continued at a small cost around the south shore of the lake. There is also a wagon road on the north side of the lake extending the greater part of the way across township 23, range 10.

The land around the lake is well timbered, but in some places it has been more or less cut for lumber purposes, and there are frequent evidences of forest fires. In these cases thick second-growth is springing up.

APPENDIX No. 50.

ABSTRACT OF THE REPORT OF P. B. STREET, D.L.S.

SURVEYS IN THE RAILWAY BELT, BRITISH COLUMBIA.

On June 12, we left Sicamous Junction up Shuswap lake to Cinnemousun narrows through which we passed and proceeded northerly up Seymour arm. This lake is very treacherous and dangerous as it is subject to sudden and violent storms. The country at the head of Seymour arm is rather rough and for the most part covered with timber. Township 26, range 7, west of the sixth meridian, in which my first work was situated, is made fractional by the boundary line of the railway belt which divides the Dominion and Provincial lands. Practically all this township lies on the east side of Seymour arm. The surface is broken by a series of ridges and valleys running northerly and southerly for the most part, the mountain range to the east also following a northerly and southerly direction. The northerly portion of Hunakwa lake lies in section 4 of this township; this lake is fed by creeks to the north and east, and empties into Anstey arm to the south. A well-cut pack-trail runs southwesterly from the head of Seymour arm to Hunakwa lake. Along the lake shore the timber is fairly open and easy to walk through, but farther back there is a great deal of second-growth cedar and hemlock, which is so dense in places that it is almost impossible to force a passage. The greater part of the south half of this township is rather dry and stony, but irrigation might be successful as two lakes of considerable depth occur in sections 5 and 6. The best timber in this township has long since been logged off or burned, the only timber of any value being some cedar in the southeast quarter of section 17, and a very few scattered white pine and fir in the other sections. Very little marsh or hay land is found in this township, but a small patch in section 16 and another patch in section 21 produce some slough hay of fair value.

None of the settlers in this township have been there long enough to have fruit trees which are producing, but the trees that I saw seemed to be doing well. There are patches of nearly level land varying from five to fifty acres which would be suitable for fruit farming, especially small fruits, and if irrigation can be resorted to, probably fifty per cent of this township can be successfully cultivated. The soil varies from a light sandy loam on the ridges to a heavy clay on some of the flat lands, but this clay does not occur extensively. One settler in section 16 showed me some good vegetables grown without irrigation. In sections 7 and 8, where there was once a logging camp, timothy and clover were growing most luxuriantly, which suggests that the ridges unsuitable for fruit or root crops might make very good pasture.

Rain fell freely during June and July, but August was rather dry and very warm. The lake rises until the first week of July and then commences to fall, the water falling rapidly in August. No minerals were found in this township, although small pieces of rock containing good mica samples can be found almost everywhere. About twelve miles north of here there are a great number of claims staked out, and some very good samples of silver and lead ores are brought down every week. The old pack-trail to the 'Big Bend' country starts at the head of this arm and the provincial government are building another road up to the mining claims.

There seems to be no game in this district, as none of our party saw any grouse, ducks, rabbits or larger game during the ten weeks we were in the district. Some very good trout can be caught at certain seasons of the year, and the annual salmon run provides the settlers with their winter supply of fish, the salmon being easily speared in the shallow water, and either salted or smoked for future use.

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On completing this work I moved across the arm into township 26, range 8. The Arrow Lakes Lumber company have their offices and supply post here on Celista creek, and have four camps up the creek. This township is also fractional and is still partly held under timber berth. Some excellent land is found here, and Celista creek would make irrigation very easy. In section 2 there is land almost entirely cleared, consisting of good rich clay loam. There is considerable timber left in this township yet, but it is mostly hemlock. Some birch, for which there was a good demand last summer, when cut into cord-wood, grows on the ridges. The Arrow Lakes Lumber company have a large stern-wheel steamer which makes occasional trips up to this camp, and which will carry and deliver any freight for the settlers. The Fruitlands company are going to build a small steamer to run from Sicamous Junction to their property, for the benefit of the settlers. This company built a hotel and a store and succeeded in getting a post-office. 'Seymour Arm,' started this summer. They have about twenty settlers on the lands now. Considerable water-power could be developed along Celista creek, there being a series of falls just inside the railway belt. There is also considerable water-power on Seymour river, but this will probably be utilized when mining operations begin. On completing the work here I received instructions to proceed with the survey of agricultural lands in township 22, range 1, west of the sixth meridian and accordingly moved my party to Revelstoke. I sent my assistant, who had arrived just before the completion of the work on the lake, down to Green-slide with the party and outfit, and took my rowboat and a load of provisions down Columbia river to the camp at the foot of the slide.

The surface in this locality is much more rugged than in Shuswap, there being less bottom-lands and the bench lands being much more sloping. Practically all the best farming lands in this district are held by timber berth leases and immediate settlement is prevented. There are plenty of large fir on the bench lands here and less hemlock than on the lake, but the most valuable and accessible patches of timber are under timber berth licenses. The south half of this township is very rocky on the east side of the river, and is useless for agricultural purposes. The soil in this district is mostly clay loam, and the settlers are getting exceedingly good results. Some hay lands occur along the river, but the floods deposit so much mud on the hay that I am told it is next to useless. I think that this district is best suited to raising small fruits as these require little moisture after July. We noticed some grouse, rabbits, ducks and a great many signs of black bears in the district, while goats, caribou, deer and grizzly bears were found above the snow-line.

Lumbering is the chief industry, there being a large mill at Arrowhead, and many camps at various points on the river and on the Arrow lakes.

A wagon road is being built from Revelstoke, and during the present year was completed to the north boundary of this township. The Arrowhead branch of the Canadian Pacific railway also gives ready access to this district.

On completing the work here, I moved into township 24, range 2, west of the sixth meridian, to survey some legal subdivisions which are withdrawn from timber berths. As this township adjoins the town of Revelstoke, the lands here are decidedly valuable, and although the available farming land is limited in extent the soil is very rich, and the land is practically all logged off, making clearing very easy. Settlers in this district are making money hauling cord-wood to Revelstoke. A good wagon road runs through this township. I left Revelstoke on November 3 and moved to Golden. Fearing early snows I decided to survey the higher lands first, leaving the flats till later and accordingly placed my camp on Hospital creek, about three miles by road from Golden.

The country in this district is more easily accessible than the valley south or north of Revelstoke, wagons being used almost entirely. There are more bottom-lands and considerably more bench lands here than in the lower Columbia valley, and as most of these benches are lightly timbered, they are very easily cleared. The land

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being much less rolling, such crops as fall wheat are raised and yield good results. The uplands, over 3,500 feet above sea-level, are frequently found covered with hay which makes fair pasture. Small fruits do well here but up to the present no fruit trees have proved a success, the trees all beginning to bear profusely in the second or third year and succumbing early. Root crops, however, do well.

The Columbia River Lumber company have a large mill at Golden which is at present supplying the town with electric power and lighting. This company own large limits in this district and furnish employment to hundreds of men.

The Kootenay Central railway, which is to run from Golden to Cranbrook, is being pushed rapidly to completion, and will open a large and fertile country to the south.

As in Revelstoke, fuel is rather expensive, and the settlers were making money this fall selling cord-wood, some of which was cut within a mile of the town. A great many logs have been taken out by settlers in this township, and a great deal of cord-wood has been cut under permit. This has removed the bulk of the large trees, and in many cases clearing would be easy, the second growth being mostly poplar, birch and jackpine.

APPENDIX No. 51.

ABSTRACT OF THE REPORT OF J. N. WALLACE, D.L.S.

SURVEY OF PART OF THE FOURTH MERIDIAN.

During the season of 1909 the fourth meridian was surveyed as far as the twenty-first base line, at the north of township 80. This last season it was continued to the middle of township 95, being a further distance of eighty-seven miles.

I had sent a large quantity of supplies from Edmonton, expecting to be able to get them up to township 80 on sleighs, but as a road had to be cut out, and the spring opened up nearly a month earlier than in 1909, the result was that these supplies had only reached township 71, when the snow suddenly went off, and they had to be cached there. Subsequently they had to be taken north on packhorses, and during the season I had to pack everything from township 71 until the line reached McMurray (formerly Clearwater) river in township 89, a distance of one hundred and eight miles in a straight line, and about one hundred and fifty miles by pack-trail.

In order to carry the survey north of McMurray river, it was necessary to find some means of transportation other than by pack-trail along the meridian from Cold lake, and two routes presented themselves. One of these was to follow the old route from Prince Albert, by way of Isle a la Crosse and Methye portage, to McMurray river. The other was to send freight in scows down Athabaska river to McMurray and from there up McMurray river.

By the Prince Albert route freight can go by railway one hundred miles northwest to Big river. From there it must go to Isle a la Crosse by sleighs in winter, then to the north end of Buffalo lake by steamer, and from there to the head of Methye lake by canoes. From what I know of the difficulty of getting freight from the north end of Buffalo lake to the crossing of the meridian on McMurray river I do not think this route would be satisfactory.

By the Athabaska route there is no great difficulty in getting freight to the Cascade rapids on McMurray river. There are no rapids between McMurray and this point, which is only twelve miles west of where the meridian crosses McMurray river.

For the next eight miles above Cascade rapids there are many other rapids. There are fairly good portages past them all, and in former years these were utilized, and freight went right up to the end of the wagon road leading from McMurray river to Methye lake, then down this wagon road and so to Prince Albert. However, when freight has to ultimately go only as far as the fourth meridian which crosses the river about twelve miles above the Cascades, and only three miles above the last of the other rapids, it does not pay to take it over these portages and use the short stretches of navigable water intervening between them. It is much better to have freight taken in scows to the Cascades, and from there on to the meridian by pack-horses or sleighs.

Before leaving Edmonton in April to commence work on the survey of the meridian I ordered a large amount of camp supplies and oats. These together with some sleighs and harness and a number of survey posts were to be sent to Athabaska Landing, and from there to be taken on contract to Cascade rapids on McMurray river, or farther up the river, as circumstances would permit. The total weight of all was fourteen tons, and the rate was six dollars from the Landing to the Cascades. One of my survey party went with this freight as it is necessary to send some representative to see that proper care is taken of it, and moreover a house had to be built at

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the Cascades to hold the goods. There was practically nothing lost on the way, and the whole came through in good condition in face of the numerous small difficulties which are of such common occurrence in northern transportation. A very substantial house, capable of holding the entire load, was built on the north side of McMurray river at Cascade rapids, and this house should prove of value for several years.

On April 21, the party left Edmonton for Onion lake, and I followed next day. From Onion lake we proceeded to Cold lake, and then travelled northerly around the west shore of Cold lake, and Primrose lake to the intersection of the fourth meridian. So far we had used hired teams with wagons, but north of here we had only the pack-trail cut out during the season of 1909. Mr. Christie, D.L.S., has however this last season cut out a wagon road for some eight miles farther north ending at the northeast corner of township 68, range 1. Half of my packhorses were at the time engaged in picking up the supplies which had been left in township 71, so I could not take on all the party at once north of Primrose lake. This delayed the arrival of the whole party at Calder river so that we could not leave this river till May 23, when I had the full outfit of horses.

After five more days travelling north along last season's pack-trail we reached the north of township 79. From here a new trail was cut out, the old trail having been made in the end of the season of 1909, when the ground was frozen and it was not therefore fit for summer use. This new trail had to be cut almost due west for about five miles to avoid swampy land and then it turns north along the east side of Landels river to the junction of Graham creek. From there it runs northeasterly to a point about a mile west of the northeast corner of township 80, range 1, which was the nearest we could get to our starting-point, the survey having ended in 1909 at the north of this township. This involved cutting out altogether about eighteen miles of new trail.

Work was commenced on the meridian at the north of township 80, on June 2. Even here at the commencement of the season every pound of outfit and supplies had been packed on horses a distance of sixty-five miles from the cache where it had been left when the snow melted.

By July 1, seventeen miles of meridian had been run north but the great distance which supplies had to be packed proved a serious hindrance especially as the season became very wet after the middle of June. It was very dry farther south, but with us the country was flooded for weeks at a time.

The meridian reached the south shore of Garson lake on July 10; it runs almost across the middle of the lake, the distance being very nearly six miles.

The following is a general description of the country to this point, commencing at the north of township 80. For the first couple of miles the land is undulating, generally burnt over with much swamp area and many small lakes. After this it rises, and the timber is heavier. The land to the east is hilly with a generally hard and in places rocky surface. There is a general growth of large poplar on the high land, and small spruce grows thickly on the lower land. Newby creek, a stream twelve feet wide and four feet deep flows west across section 12, township 82. It is a tributary to Landels river, which it joins about twelve miles west. On both sides of this stream the country is composed of ridges of jackpine. There is hardly any grass along the creek the valley being very narrow and rising almost at the edge of the creek. For the remainder of township 82, the land is high and rolling, becoming more level towards the north where the line runs through small spruce partly burnt, with scattered patches of poplar. Jackpine is not so common as it is to the south. The soil in the spruce lands is the best, while the higher lands are composed of a surface soil of a few inches of black loam overlying a somewhat hard white clay with a few small boulders. This is the usual type of soil where large poplar occurs. This class of country continues to Kimowin creek, which crosses the line in section 24, township 83. There is some good land to the west of the meridian.

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For about half a mile north of Kimowin creek the land is dry and carries some large poplar and pine. It then becomes very swampy for about four miles, the line crossing a small lake, called Fornby lake, which is surrounded by bog land. The northeast corner of township 83 falls in this lake, which drains westerly by a stream flowing to Landels river. Its surface is at an elevation of 1,670 feet, this being the lowest elevation met with on the meridian between Cold lake and McMurray valley. The district is exceptionally swampy with much flooded slough land, bog land and tamarack swamp.

About two and a half miles farther north the meridian intersects the south shore of Garson lake, the last mile before reaching this lake being through a high dry country covered with large poplar. It crosses the lake a little to the east of its centre, the distance along the line over the water being almost six miles. The intersection of the twenty-second base line occurs in the middle of the lake. From this point it is about three miles to the east shore and about five miles to the west shore. Measured along the meridian it is two and a quarter miles from this intersection of the base line to the north shore of the lake.

Garson lake is about ten miles long, running in a northeast and southwest direction, and about six miles wide. It contains about forty square miles. The lake is shallow, and, as the locality is very much exposed to the wind, the surface is seldom calm, consequently the water is generally very muddy from the fine sand which forms the bed of the lake.

Except on the southeasterly part the shores are low and very swampy, being almost surrounded by a belt of tamarack and spruce swamp half a mile in width. Along the southerly half of the east side of the lake, and for some distance around the south, the land is high and dry. There is a small Indian village consisting of seven or eight houses and a floating Indian population of about forty persons who remain there on account of the whitefish in the lake. Potatoes and other vegetables are grown here by the Indians and do well, as the soil is somewhat sandy. The village is situated at an elevation of about thirty feet above the lake in a small open area. There is no other open land near the lake, but there is a considerable area around the southeast of the lake which is only lightly covered with small poplar, and there is good feed for horses.

From Garson lake two routes can be travelled to the Hudson Bay post at Methye portage. The most direct runs a little north of northeast and is about eighteen miles in length. It is a purely winter road and while well opened out for one-horse sleighs it is quite unfit for travelling with horses in summer, as it runs through continuous swamp land. The second route takes a long detour to the south, and is about twenty-eight miles long. Packhorses can travel by this trail in summer, but if carrying a load there are breaks near both ends where canoes must be used. For freight going from the Hudson Bay post to Garson lake the only way is to have it taken in canoes down the west side of Methye lake for a distance of about two miles, and then across a small portage for a hundred yards into another small lake. At the south end of this lake the load is picked up by packhorses and taken southerly. A load cannot be taken directly from the post on horses as the trail down the south shore is too swampy and a deep inlet has to be crossed. From the south end of the small lake the trail runs southerly for about a mile along the lake, and then for about six miles southwesterly. A sharp turn to the west is made here and a new branch trail running westerly is used. After about thirteen miles on this new trail, which runs through dry poplar and pine country, the crossing of Garson river is reached. The last half mile to the river is through a very bad tamarack swamp. The load is taken from the horses at the river and sent about three miles up this river in canoes to Garson lake.

Garson river is here a very slow deep stream, about fifty feet wide, with a belt of slough land extending on each side from fifty to three hundred feet. The river leaves the lake about three-quarters of a mile north of the Indian village.

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From the foregoing it will appear that, although on the map it may look as though Methye portage would be a good basis for supplies for the survey of the twenty-second base line west of the fourth meridian, it is really practically useless for this purpose unless freight is sent across to the Indian village at Garson lake in winter.

A route which might be feasible for summer is the following: Freight from Buffalo lake could be left at a small settlement on the west shore of Methye lake about five miles south of the Hudson Bay post. From here it could be taken by teams a few miles southwesterly across a portage to Garson river, and then sent up this river in boats to Garson lake. This river is navigable for boats.

On the whole, however, I think the best way to get freight to this base line would be by McMurray river, a trail being cut southerly to intersect the base line some miles west of Garson lake. The immediate neighbourhood of the meridian should be avoided for at least the southerly twelve miles, as it is very swampy.

By July 22, all the camp had been moved across Garson lake and the meridian was surveyed up to the north of township 85.

We had much trouble getting the outfit to the north of Garson lake, owing to the swampy nature of the country around the northeast. The horses could barely get around without any load, and we had only one small boat and a couple of birch-bark canoes, the latter only able to carry a man and about two hundred and fifty pounds of freight. A small stream, called Pennel creek, flows into the north of the lake, its outlet being a few hundred yards east of the fourth meridian. We used it for transportation for about two miles up from the lake, and this got us over the worst of the swampy area.

North of Garson lake the meridian runs through much swampy land, the country rising slowly. The timber is small pine, spruce and tamarack, and the surface all moss covered. Just north of township 85, we encountered another lake with very swampy shores around which we could send the horses without loads only, and had to make a raft to carry the outfit across. There has been so much rain that the shore of this small lake was flooded for over a quarter of a mile inland, and the ground was so soft and boggy that a man would sink in it to his middle, although the water was so shallow that we had trouble in getting a raft to float over the reeds.

Although this lake is connected by a creek flowing from its southerly end to Garson lake, and there is a fall of over forty feet between the two lakes in a distance of four miles, yet for several weeks the stream could not carry off the water quickly enough to cope with the flood. North of this lake for about two miles the country is swampy and partly burnt over. The land then rises and much poplar country is met with in the north of township 86. Through township 87, the country is generally dry and rolling along the meridian, and westerly from it. There is much poplar country and some good land out towards Gipsy lake, the east shore of which is about eight miles west of the meridian. East of the meridian there is, however, much swamp land, an extensive area extending out to Methye lake, and there are many small lakes in the district.

The west end of a very large swamp is crossed in sections 1, 12 and 13, in township 88, the swamp extending for two miles and a half along the meridian, and easterly as far as the road from Methye lake to McMurray river, widening as it goes to the east. The intersection of the twenty-third base line occurs about a quarter of a mile before the sudden descent to McMurray river begins.

On August 31, camp was moved to the south shore of McMurray river. The long haul of supplies from township 71 was over, and fifty miles of line had been run under greater difficulties than I, at least, had ever before encountered.

The valley of McMurray river, where it is crossed by the meridian, is badly broken by ravines on both sides. The horizontal distance between the edge of the high land on the south and on the north sides of the river is nearly three and a half miles. The valley is somewhat wider here than elsewhere in the neighbourhood, as a long tributary valley, running northwest, cuts up the land on the north side of the valley. The depth of the valley from the high land to the water of McMurray river is six hundred feet on the south side, and eight hundred feet on the north side, and there is very little level land near the river. The elevation of the edge of the high land on the south side of the valley is 1,750 feet, and that of the river is 1,145 feet, a total fall of 605 feet in a mile and a quarter, much the greater part of this occurring in the first half mile from the top. The descent is very rough and broken by ravines. The lands are all thickly timbered with poplar and spruce of large size. Within ten miles of the meridian on either side there are only two small open spaces. Both of these are on the south side of the river. One is at the end of the portage road from Methye lake. It has an area of about thirty acres. The other is about a mile west of the crossing of the meridian, and contains about seventy acres. Much of the latter is very wet from springs.

There are many areas of good soil in the valley but it is all very thickly timbered. Spruce and poplar up to two feet diameter are common, and there is a large amount of birch up to eight or ten inches. There are many areas of timber of commercial value, especially farther down the river.

To the north of the river the land rises suddenly, attaining an elevation of 220 feet higher than the water in a little over a quarter of a mile. The northerly slope of the valley is very rough. The edge of the high land to the north has an elevation of 1,935 feet, being 790 feet above the river, although a local ridge some thirty feet higher is crossed before reaching the north edge.

McMurray river varies very much in width along its course. It averages about one hundred and twenty yards. The immediate bank of the river is from three to ten feet high. The bed of the river is usually a hard fine sand. The depth of water varied along its course from three to ten feet in the latter part of August. The season was an unusually rainy one and the water was high all summer. The water is very good, but not remarkably clear. The river is not too swift for a raft, but swift enough to make rafting a very slow means of crossing. It is much better to have a canoe. There are practically no open spaces along the river near the meridian, but enough grass occurs, scattered among the poplar, to feed packhorses for a short time. Horses cannot ford the river anywhere as they would have to swim at least half the width.

The nearest rapids to the meridian are Whitemud falls, which are about three miles west of the crossing of the meridian. The total fall here is probably between forty and fifty feet, and this should be valuable for water-power. To the east of the meridian there are no rapids for about seven miles. Above that it is reported that small rapids are so numerous as to render the river unsuitable for navigation.

By September 13, we had surveyed the meridian as far as the high land on the north side of the McMurray valley, after a very laborious time in getting across this very rough area. From here it runs across a country almost entirely timbered with jackpine. Small local depressions occur carrying spruce, but jackpine is much the commonest timber. There are very few swamps. An extensive area of swamp land occurs across the east of section 13, township 90, and the greater portion of the east of section 25 in the same township is also swamp.

Sutton creek crosses the meridian in section 25, township 90. It is a deep stream about fifteen feet wide, flowing west. The current is rapid, and the water is good.

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North of Sutton creek there is very little swamp area, much the greater part of the district being composed of low rolling ridges with very sandy soil, while the timber is practically all jackpine. These ridges become small hills farther north, and wet land of any kind becomes extremely rare. The general elevation of the country is very high, averaging about eight hundred feet higher than McMurray river at the crossing of the meridian. These rolling hills and the general high elevation extend for at least ten miles on either side of the meridian, and fifty miles north of McMurray river. There must be a very large fall in the surface somewhere between the meridian and Athabaska river to the west, and ultimately a great drop in elevation in the north before Athabaska lake is reached.

All the streams crossing the meridian north of McMurray river flow westerly. For some reason many of them have an area of very wet land on either side. For a distance of a hundred yards or so on either side the land is so soft and wet and full of holes, that it is impossible to get horses up to the stream, without first making a roadway, and water cannot be obtained for camp purposes, without getting wet up to the knees. These borders of wet land are more like rough slough land than anything else. The streams flow in a depression, with a hard, dry ridge on either side, but the space intervening between the edge of the ridge, and the stream is nearly always boggy. It is not caused by flood water, for even in times of low water, the same conditions prevail. I think this wet border is due to springs coming out to the river, the rain water over the district having percolated down to a certain level through the sand, and then making its way underneath to the streams, instead of being discharged over the surface, into small tributary creeks, as is usually the case. One of the results is that it is very difficult for horses to get any grass, as there is little of it along the stream, and the ground is there too soft to support a horse.

On October 8, the meridian had reached the northeast corner of section 12, township 91. On this date I sent out thirteen of the horses with some of the party. The grass was practically all gone. We had been feeding oats since September 19, but the number of horses was too great to feed oats to them all. These horses were taken southerly along the meridian and after a difficult journey reached Cold lake, where they were left with the Hudson's Bay Co., and the men proceeded to Edmonton, arriving there on November 8.

I had ten horses left in camp, but as there was no snow we had to still use pack saddles, although such a small number of horses made packing a very slow means of transportation.

Through township 92, the land is generally rolling, becoming very hilly in the north half. The timber is nearly all pine, and the lands all dry, and generally very sandy. In the north half there are many small lakes in the hollows. These have hard dry shores and good water, although they have no streams either flowing into or out of them. In section 36, the meridian crosses a remarkable valley, the bottom of which is three-quarters of a mile wide, and one hundred and fifty feet below the land on either side, the descent being steep. The valley extends for about eight miles a little to the south of west where it joins a large valley running north and south. It also runs for some miles to the northeast of the crossing of the meridian. Viewed from the high land it appears as though it were the valley of a large river, but it only contains a very small creek flowing to the west through flat swampy land in the bottom. The valley is a purely local depression, the land on both sides being much higher for many miles, to the north and south. The general elevation of the country is about 2,000 feet, while that of the creek is 1,865 feet.

Fire has overrun the whole country north of McMurray valley in comparatively recent times. As far north as the middle of township 92, the last fire appears to have occurred about four years ago. These fires were very extensive owing to the absence of any large streams or swamps to stop their course.

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This last fire was not strong enough to entirely burn up the timber and a small proportion of the trees still have green tops, although scorched lower down, and even those entirely killed have not had their branches or bark burnt off and have not yet fallen. These latter will make travelling difficult in the next few years, as they will soon blow down. Over this area a light growth of new pine, now about eight inches high, is coming up, but it looks feeble.

North of the middle of township 92, the last fire appears to have occurred about fifteen years ago, and there is now no standing burnt timber, but the ground is strewn with much small windfall. The new growth of pine is very dense through the north half of township 92, and through township 93. It is generally only about ten feet high, but looks strong and healthy. There are small isolated patches of unburnt living pine averaging about six inches in diameter, scattered irregularly over the district, these having for some reason escaped the general conflagration.

If the past history of the area north of McMurray valley is to be judged by the extreme scarcity of any timber over a few inches in diameter, either now living or dead, it is a history which does not augur well for the future chances of the new growth now coming up. The last growth is only eight feet high, and the previous growth was not given a chance to attain over a few inches in diameter. The same record of new growth coming up to replace the one destroyed by fire, only itself to be destroyed before it could reach maturity, has probably been going on for centuries. Fires have not only destroyed the timber but they have burnt off all the decayed vegetation which formed about the only source from which these sandy areas could have derived fertile soil.

It is too late now, even if fires were kept out, for soil to accumulate, but jackpine can grow on these sandy areas where apparently nothing else can grow, and if given a fair chance it will grow at least twelve inches in diameter.

While no doubt there are a few other causes of forest fires in the north, the main cause is a camp-fire left smouldering. The average traveller in that country knows enough to keep a fire under control when he is lighting and using it, but he does not know enough to see the necessity of extinguishing it when he is done with it. The cases where a man cannot extinguish a fire for want of water or for some other cause are very few. The cases where, when he is leaving, he looks back at the half extinguished fire, knows there is a risk, but deliberately chances it, are very common; and such cases are not due to laziness, but are often due to that fault of character, especially common in the Northwest, which thinks it a weakness to take precaution against a danger rather than to risk its occurring.

On November 10, the meridian had reached the north of section 13, township 94, a distance of thirty-one miles north of McMurray river. The snow had been sufficiently deep to use sleighs on November 5, but some of the swamps were not then sufficiently frozen to carry horses. On November 10, the horses were sent back to McMurray river to bring up the sleighs which had been sent down from Edmonton with the McMurray freight, and were now at Cascade rapids. The teams were delayed by the swamps not being sufficiently frozen, and did not get back to camp until November 26, by which time the meridian had been surveyed up to the north of township 94. From McMurray river we had throughout been cutting a sleigh road in addition to a pack-trail, and this road was now called into use. There is now a good sleigh road from the house at Cascade rapids on McMurray river to the north of section 13, township 95.

Through township 94 the country becomes very hilly. Jackpine is almost the only growth of any kind, and the soil is almost all pure fine sand with only half an inch of moss on the surface. The pine is generally very small, often only a few feet high, and does not grow thickly. Very little cutting is required even to make a wagon

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road, and the surface is all dry. There are numerous small lakes in the hollows, most of which have no streams flowing into or out of them, yet these lakes are all within a few feet of the same elevation although many miles apart.

Township 95 is much more thickly timbered but it is all jackpine. Areas covered with six-inch pine now become much more extensive than farther south, and the surface is more hilly than ever. A remarkably rough ridge, about two hundred feet high, and running for some miles to the east and west crosses the meridian in section 12. The elevation of its crossing is 2,098 feet.

The survey of the meridian was ended at the north boundary of section 12, township 95, at a distance of thirty-seven miles in a direct line north of McMurray river, but apparently the high general altitude, the hills and the jackpine, and the generally barren surface extend for many miles farther to the north.

LEVELS.

The levels taken last season along the meridian were continued this season using the same basis of elevation throughout. According to this basis the elevation of the water in Primrose lake, at the time of commencing the levels (May, 1909) is taken as 2,100 feet above sea-level.

The same instrument was used, a fourteen-inch dumpy level. The elevations recorded are the surface of the ground at every quarter of a mile along the meridian, all streams and lakes crossed by the meridian, and the surface of the ground, at the transit stations. These last being placed always on the summits of the local ridges may be taken as indicating the higher elevations in the vicinity, while the levels on the streams and lakes indicate the lower elevations.

Bench-marks were left at intervals seldom exceeding half a mile, generally near a section or quarter section post, but if a prominent large rock occurred elsewhere along the line a bench-mark was always recorded on it.

The levels were checked throughout, usually in sections of a mile or a mile and a half, by a second independent line run in the opposite direction. The only exceptions to this rule of running a second line occur for two miles in township 88, where a very bad swamp was crossed by the method of double turning-points, and also when crossing part of McMurray valley where there is a fall of 600 feet on the south side and 800 feet on the north side, and the surface is very broken. This valley was levelled across once in the usual way, and the levels checked by the use of vertical angles with the transit.

At the point of commencement of this season's survey, that is at the north of township 80, the elevation is 1,860 feet, or 240 feet lower than Primrose lake. As the meridian goes north the elevation remains within a few feet of this for nearly three miles when the land begins to rise, and at a distance of four and a half miles from the commencement the line reaches an elevation of 1,961 feet. From here it descends rapidly for five miles to the crossing of Newby creek where the water level is 1,756 feet. This stream flows west in a narrow local valley about fifty feet deep joining Landels river about eleven miles west of the meridian.

After leaving the valley at Newby creek the land rises steadily to the north, attaining an elevation of 1,804 feet after two and a half miles. It then descends for three miles to Kimowin creek, which is crossed in the middle of section 24, township 83, and is at an elevation of 1,674 feet. There is then a slow rise for three miles, the elevation reaching 1,714 feet at the north of section 25, township 83, north of which occurs a rapid fall of 44 feet in three-quarters of a mile to Formby lake where the elevation is 1,670 feet. This is a very swampy region. The lake is at the lowest elevation encountered in the whole distance surveyed in two seasons from township 64 to township 95, except only the local deep valley of McMurray river.

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The low elevation continues for two and a half miles north of the lake, after which the meridian crosses a local ridge at an elevation of 1,734 feet in the north of section 12, township 84, and about a mile south of Garson lake. The ridge referred to between Formby lake and Garson lake forms part of the divide between the watersheds of the Athabaska and Churchill rivers. Formby lake drains westerly to Landels river, while Garson lake drains northeasterly and ultimately to Churchill river. The elevation of Garson lake is 1,675 feet.

North of Garson lake, although the land rises steadily, it is very swampy for several miles. At a distance of three miles north of the lake a total rise of fifty-one feet has occurred after which there is a fall of nine feet to the surface of a small lake, called Raft lake. This lake empties into Garson lake by a small creek flowing southerly, but, although there is a gradual fall of over forty feet between the lakes, there is so much moss and vegetation along its course that the land all around Raft lake is very swampy for want of more speedy drainage than this creek can afford, even with such a great natural fall.

The land rises north of Raft lake but is still swampy until the north of section 13, township 86, is reached. Here the land rises more rapidly, reaching an elevation of 1,824 feet in section 25, township 86, being a total rise of 149 feet in sixteen miles from Garson lake. Between here and the edge of McMurray valley there are only minor irregularities, the general elevation being about 1,750 feet. A large tamarack swamp is crossed in sections 12 and 13, township 88, at an elevation of 1,736 feet. The swamp drains both to the east and the west.

About a quarter of a mile north of township 88, the edge of McMurray valley is reached at an elevation of 1,750 feet. The river is at an elevation of 1,145 feet, a fall of 605 feet, occurring on the south of the valley.

A bench-mark was established on the north bank of McMurray river. It consists of a large iron post driven to within ten inches of the top, and stands fifteen feet north of the water's edge and in the centre of the line. The letters "B.M." with a broad arrow are cut on the south side with a cold-chisel. The elevation of the top of the iron post is 1,150.13 feet. The broad arrow cut on its side is 0.26 feet lower. It may be well to repeat here that all elevations given along the meridian are referred to one basis, and that according to this basis the elevation of Primrose lake in township 64, is taken as 2,100 feet above sea-level.

The north edge of the valley of the river is at an elevation of 1,935 feet, a rise of 790 feet from the water, and this high general elevation continues for many miles to the north. In the south half of section 1, township 90, an altitude of 1,984 feet is reached. From here the elevation falls to the crossing of Sutton creek in section 25 township 90, where it is 1,747 feet, being the lowest elevation met with between McMurray river and the end of the survey in township 95. The ridges now become more like small hills and the elevation steadily rises reaching an altitude of 2,063 feet in the north of section 24, township 92, and an altitude of 2,096 feet in section 12, township 93.

North of township 93, the district is very hilly being composed entirely of rolling hills from 100 to 150 feet above the small valleys. Local high points along the meridian reach an altitude of 1,950 to 2,050 feet, the lowest points crossed being a small creek in section 36, township 93, at an elevation of 1,890 feet, and two small lakes in sections 1 and 25, township 94, both of which are at an altitude of 1,884 feet although four miles apart.

A remarkably high and very rough ridge is crossed by the meridian in section 12, township 95, the elevation at the crossing being 2,098 feet. There is then a sudden fall to the north of section 13, township 95, where the survey ends. North of here, however, the land rises again and maintains the same general high altitude.

The divide between the waters flowing to Hudson bay and the Arctic ocean follows the neighbourhood of the fourth meridian for over fifty miles, never going more than a few miles to either side of the line. In this distance the divide crosses

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the meridian five times. Its first crossing occurs in section 12, township 78, the elevation of the land here being about 2,000 feet. South of this the streams all flow easterly, and ultimately their water reaches Churchill river and Hudson bay. To the north of this place, for a distance of about twenty-eight miles, or as far as the north of township 82, the streams flow westerly across the meridian, all of them being tributary to McMurray river, which empties into Athabaska river at McMurray. The meridian then runs through an area extending five miles north and about five miles west, from which all the water flows east. Conditions are then reversed, the streams flowing westerly from an area extending five miles along the meridian and about three miles east. This reaches section 12, township 84, which is about a mile south of Garson lake, the elevation here being 1,730 feet.

The divide now passes around the south and west of Garson lake, including this lake and all its tributary creeks in the watershed of Churchill river. It then passes around the northwest of the lake, and crosses the meridian for the last time near the north of township 86, its exact location here being not very clearly defined. At this last crossing of the divide the elevation is 1,810 feet. It then runs northeasterly passing about half-way between the north end of Methye lake and McMurray river.

There are no well-marked topographical features along the course of the divide, and there is no apparent reason why it should occur where it does any more than in any other place.

The following are the elevations of some of the more noteworthy topographical features along the fourth meridian between township 80 and township 95.

Feature.	Locality.		Elevation.
Creek	Sec. 1	Township 81	1859
Creek	" 13	" 81	1845
Summit	" 13	" 81	1889
Depression	" 24	" 81	1851
Summit	" 25	" 81	1961
Newby creek	" 12	" 82	1756
Summit	" 13	" 82	1804
Creek	" 24	" 82	1785
Creek	" 25	" 82	1717
Summit	" 1	" 83	1763
Kimowin creek	" 24	" 83	1674
Summit	" 25	" 83	1714
Formby lake	" 36	" 83	1670
Summit	" 12	" 84	1734
Garson lake	" 13	" 84	1675
Raft lake	" 1	" 86	1717
Summit	" 25	" 86	1824
Creek	" 25	" 87	1732
Creek	" 12	" 88	1731
Summit of valley	" 1	" 89	1753
McMurray River	" 12	" 89	1145
B. M. on top of iron post 15 feet north of river	" 12	" 89	1150-13
Summit of valley north of McMurray river	" 24	" 89	1935
Summit	" 1	" 90	1984
Sutton creek	" 25	" 90	1747
Creek	" 25	" 91	1826
Summit	" 36	" 91	1934
Creek	" 1	" 92	1819
Summit	" 13	" 92	1922
Lake	" 13	" 92	1878
Summit	" 24	" 92	2063
Creek	" 36	" 92	1865
Summit	" 1	" 93	2046
Lake	" 1	" 94	1884
Summit	" 13	" 94	1988
Depression	" 24	" 94	1887
Summit	" 25	" 94	2013
Depression	" 36	" 94	1881
Summit of ridge	" 12	" 95	2098

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As many areas of swamp land occur along the line of the fourth meridian a few remarks on such areas may not be out of place. The swamps over this district are not individually extensive. They are nearly all formed by the surface water being unable to get an outlet through the local surrounding ridges, and not because the entire surface of the country is so level that the water cannot drain off in any direction. The standing water over many swamps will frequently be found to be many feet higher than the water in streams within a few hundred yards of them, some intervening ridge cutting off the outlet. Even in the case of an extensive swamp it will often occur that an outlet could be made with little labor at some place around its border, and so the water could drain off the whole swamp.

The general surface of the country is rolling, yet although locally there is ample fall to carry off the surface water there is no continuous connection from one level down to another, which would ultimately discharge the collected surface water into some stream, nor is there even a continuous fall from several different directions into the larger depressions, which would result in a few large lakes being formed, in place of the many local areas of half-flooded swamps, which now exist.

In uninhabited districts, where the contour of the surface is that originally formed by nature, the greater number of the local depressions are not connected, but form a series of basins. The water from rain and melted snow will run down into the lower levels, no matter how little they may be lower than the surrounding lands, so every depression carries more than its own share of surface water. The slowness of the evaporation in these northern latitudes is emphasized by the general growth of timber, which cuts off the sunshine, and also by the absorbent nature of the mossy surface. There is always some substratum, (it may be many feet below the surface), which prevents the water readily draining downwards. The result of all these conditions is that the water lies in these depressions for so long a period each year that the surface becomes soft, and swamps are formed in nearly every depression.

The same natural conditions of surface level occur in many countries, but the unconnected lower depressions will not become swampy without the additional conditions of abundance of rain, some impenetrable substratum, and some impediment to evaporation. It is the combination of all these conditions in the timbered lands of the north, which produces so many areas of swamp.

Not only are these swamps a perfectly natural result, and a result which should reasonably be expected to exist, but their value is altogether greater than is popularly supposed to be the case. In many of the areas over the north, the greater part of the surface of the country appears to have been originally composed of pure, fine yellow sand. This is especially the case where the country is covered with coniferous timber. There are many districts where a person may travel for days, and see only the same succession of jackpine, spruce, and tamarack with practically no other timber. Where poplar is found, the sandy conditions are not as a rule nearly so marked, and birch indicates hard stony soil, but in the coniferous areas, it will be found that fine sand occurs everywhere, either coming up to the surface, as on the ridges of jackpine, or else existing immediately below the moss and black surface soil of the spruce areas in the lower lands. In such areas almost the only source of fertile soil has been the accumulation of decayed vegetation during past ages. This has been derived from the fallen needles of the pine and spruce trees, and from the growth of moss in the lower lands. Were it not for fires there would now be a great depth of such soil both on the higher and lower lands. But, on account of the prevalence of fire, land free from surface water has been burnt over again and again, with the result that surface conditions on the dry lands in such areas have changed but little from the time when the sand was first left there.

In the lower levels, the slow evaporation has kept the surface wet and has not only fostered the growth of vegetation, especially moss and lichens, but has tended to preserve these areas from fire. The much maligned spruce and tamarack swamps

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are really about the only features which have saved many large areas in the north from being almost entirely destitute of any available fertile soil.

Were these swamps so level that large expenditures would be necessary to drain them, no doubt it might be urged that, if the surface water has been the cause of preserving the soil, it has done so at the cost of making the soil now unavailable, but areas of swamp land so level as this are not common. The usual swamp has ample fall, even over its own apparently level surface, to allow the water to run off, if the surface were free of the obstruction of moss and sticks, or else it only needs a short outlet cut through some local elevation to drain itself naturally into some neighbouring stream.

Such areas must be drained before being available, but the mere cost of draining will not be great, and so long as the country is uninhabited, and fires continue to run, the want of drainage, whether caused by want of outlet, or by obstruction by the moss, is a blessing in disguise. It is that very surface water, which so many people think makes these swamp areas worthless, which has really been not only the origin, but the means of preserving the greater proportion of the available fertile soil over many large areas in the north.

The contention that in these sandy districts, a natural condition of surface contour which impedes drainage is better than a condition which lends itself to the speedy draining of the surface water into streams and lakes receives support in the conditions, which can be seen to-day, north of McMurray river. Here the land is so rolling that local undrained depressions are very rare, and swamps of a greater area than a few acres are almost unknown. The soil is nearly everywhere pure yellow sand, coming right up to the surface. The surface has been too sandy to allow the growth of vegetation without standing water, and no fertile soil has accumulated. The country has been too well drained. The area is timbered everywhere with small pine, but the fires have continually burned off the fallen needles, before they had time to decay, and there is now nothing left except a surface, which has only a few lichens growing over it.

Were it not for the general growth of jackpine (which appears to be the only thing which will grow in this area), there are many square miles here which would be composed of nothing but wind-swept hills of sand. Had this area been less rolling, and had there been more undrained depressions, which would have shut in the surface water, and have retained it, so as to form swamps, there would to-day be many acres which could be drained, and which would then afford fertile soil, instead of there being nothing now left but well-drained sandy hollows.

North of McMurray river, there are very few areas of swamp, while south of it swamps are common, and there can be no doubt whatever, that the district, which contains the swamps, is much more valuable than the other.

On November 28, the last day's work was done on the meridian, and next day, all the party were moved back southerly to a small lake crossed by the meridian in section 12, township 92 where a supply house had to be built. The sleighs were then sent to McMurray river, to bring up supplies. They reached camp on December 7. The house was by that time finished, and the remainder of the party moved to the river, reaching there on December 9. The sleighs then made a trip to the house at the Cascades, and brought up all the goods remaining there, and these were placed in a cache on the meridian, about two miles north of the north edge of McMurray valley, close to the northeast corner of section 25, township 89.

On December 13, a start was made for Methye portage, and it was reached on the 15th. The distance from the meridian to the road running to the lake from McMurray river is about seven miles. The ice was just strong enough to carry horses, but there was still some open water in places. From the river, it is twelve miles to Methye lake, and then, eight miles southwesterly, across the lake, to the H. B. post. There is a summer trail around the west shore, but it is unfit for use with horses.

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We left Methye portage on December 17, and travelling over the ice of Methye lake, and Buffalo lake, reached Isle a la Crosse, on December 23, a distance of one hundred and ten miles. From there we travelled to Green lake, and thence to Big River, and getting a train there, reached Prince Albert on the evening of December 31.

The total distance from Methye portage to Big River is 275 miles. The ice was fairly good throughout.

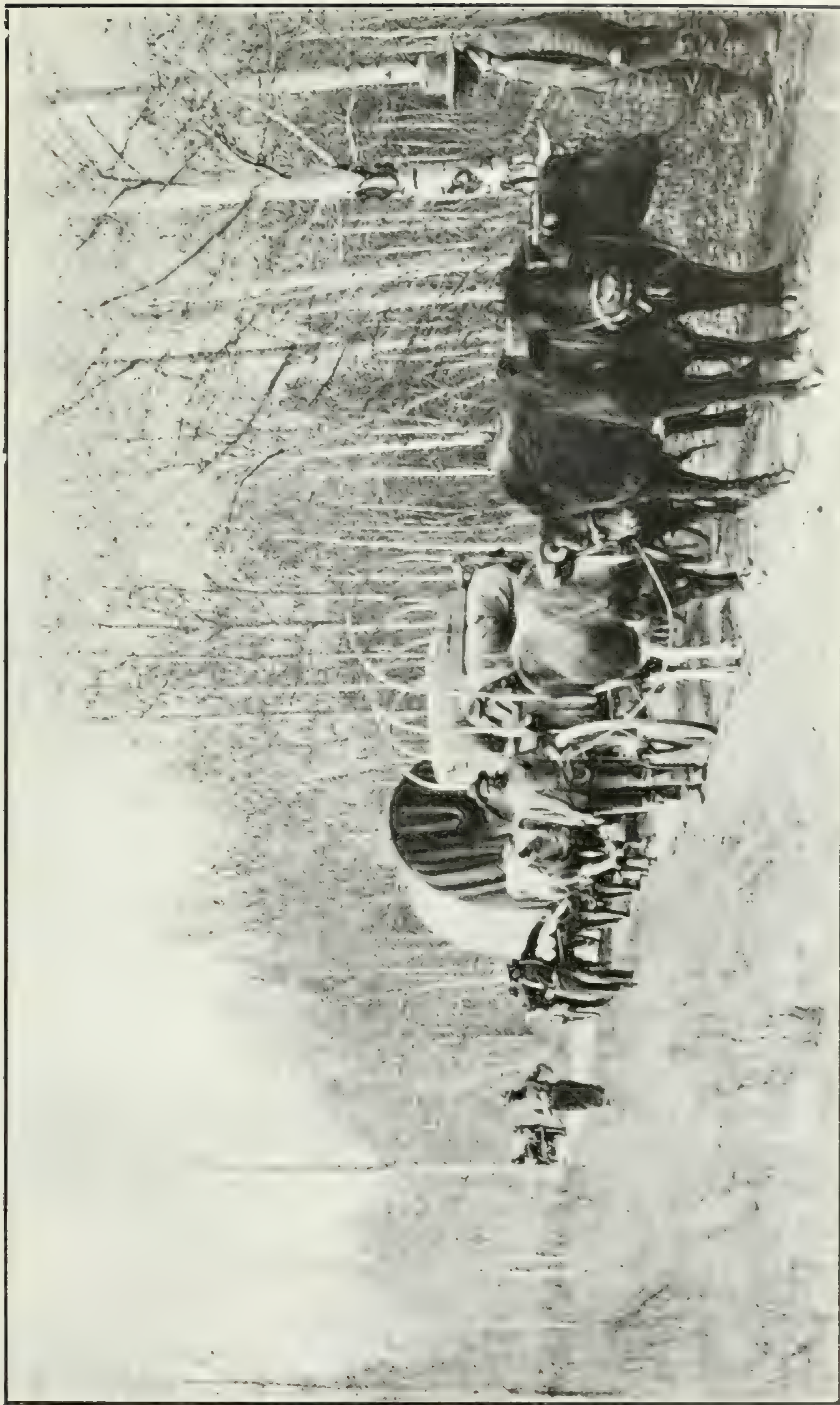


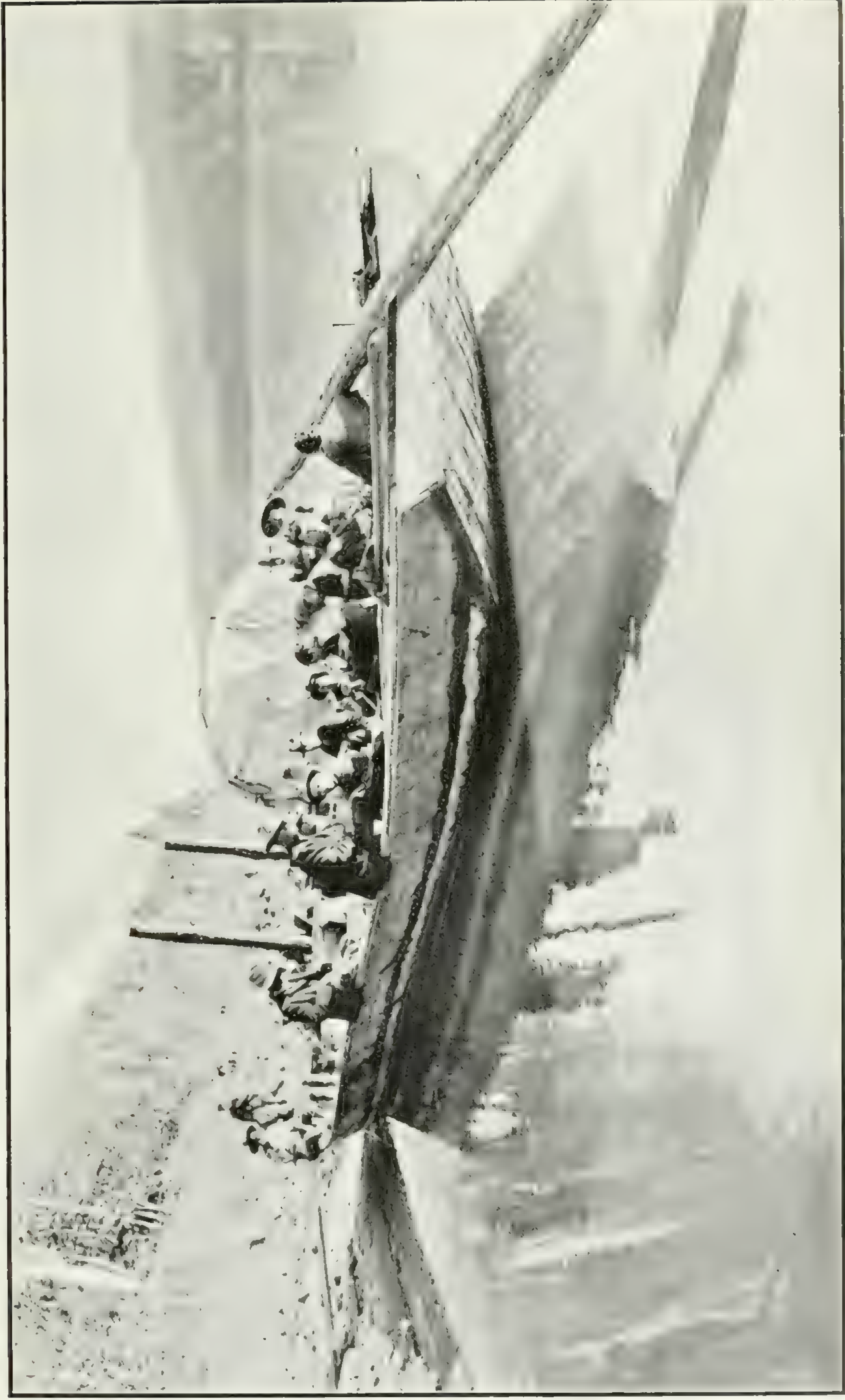
Photo by C. Engler, D.L.S.

Settlers on road to Athabaska Landing.



Photo by C. Engbr, D. L. S.

Tracking on the Athabasca river



The passengers' supper in the cook's scow, Athabaska river.

Photo by C. Engler, D.L.S.

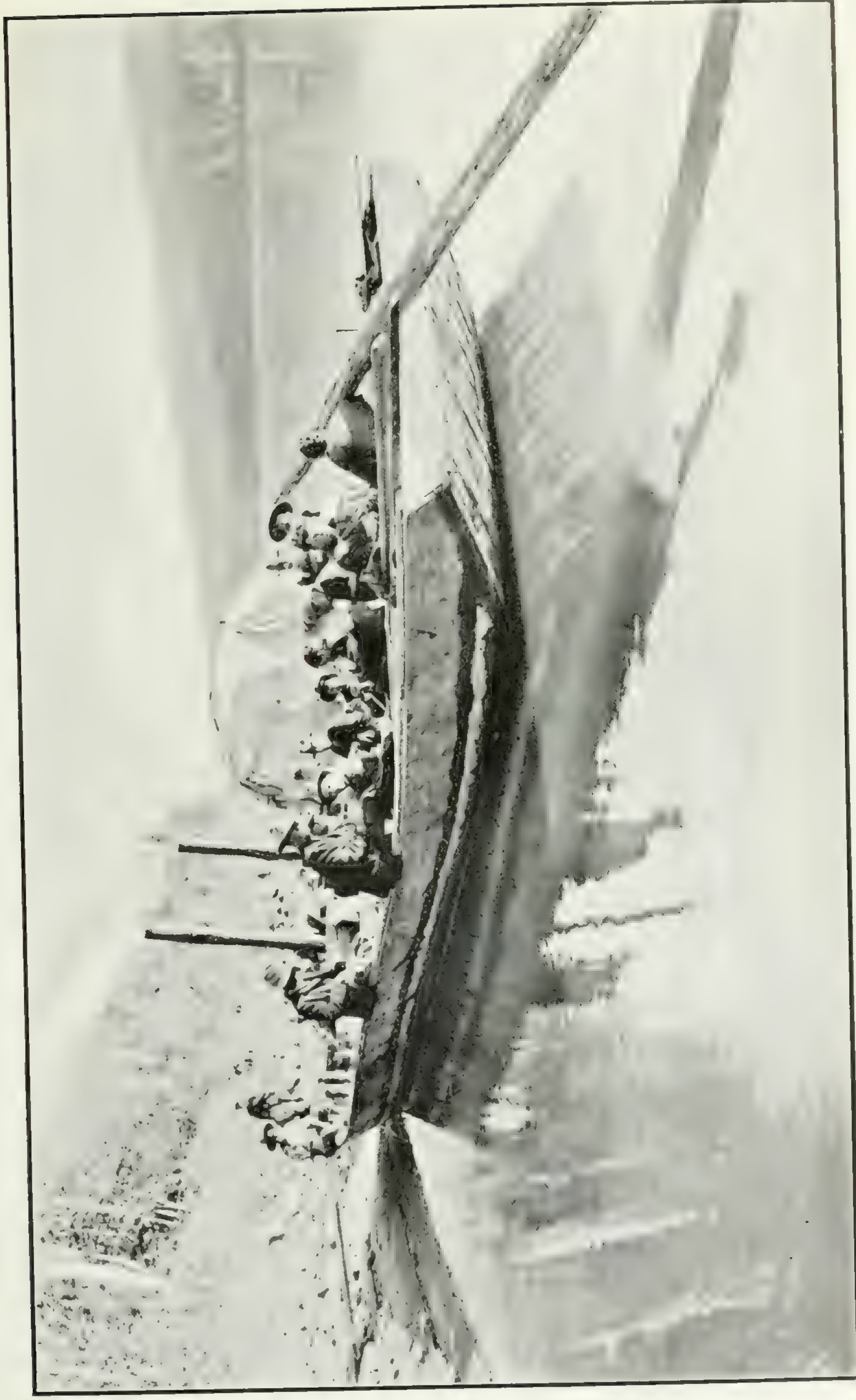


Photo by C. Engler, D.L.S.

The passengers' supper in the cook's scow, Athabaska river.

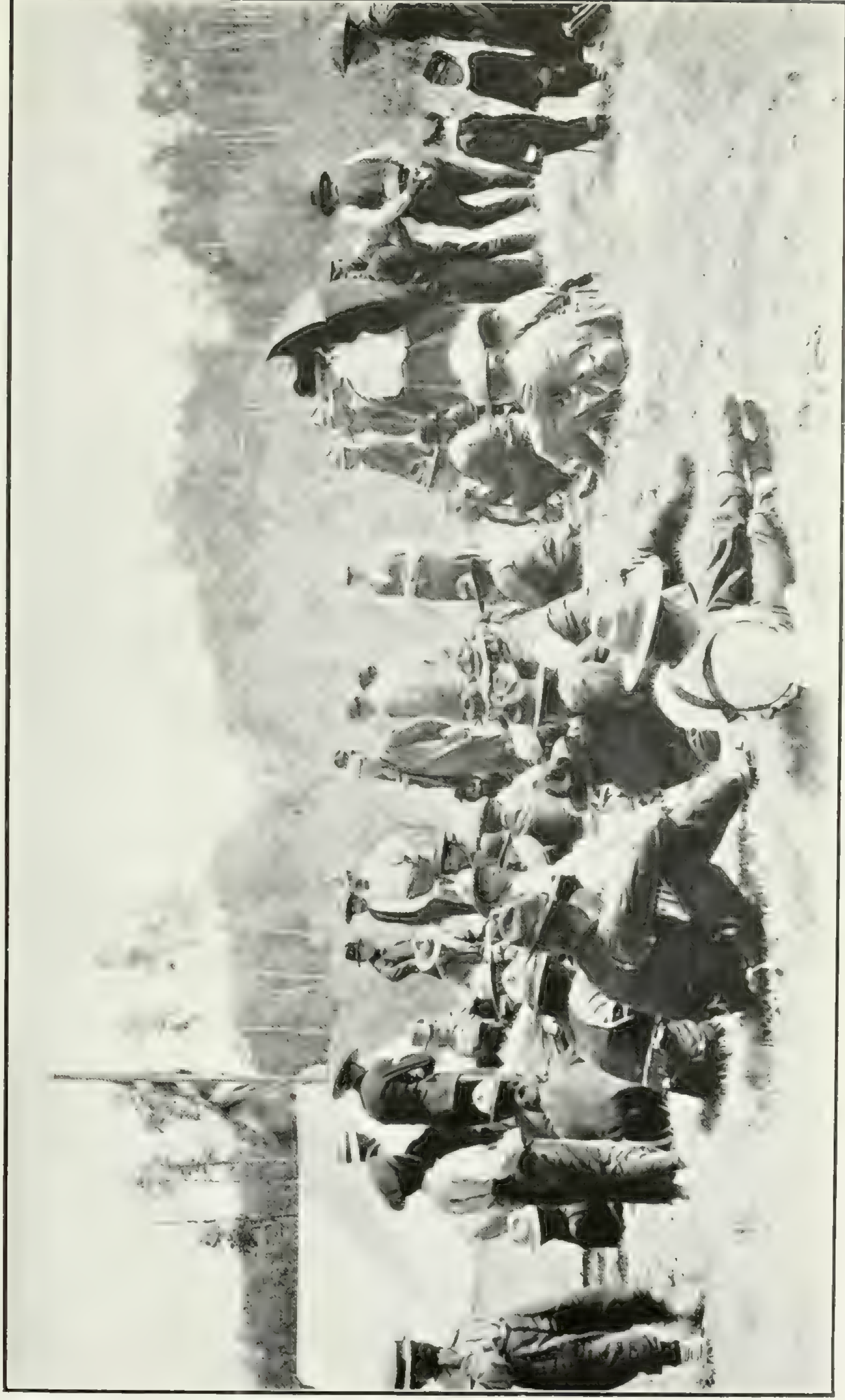
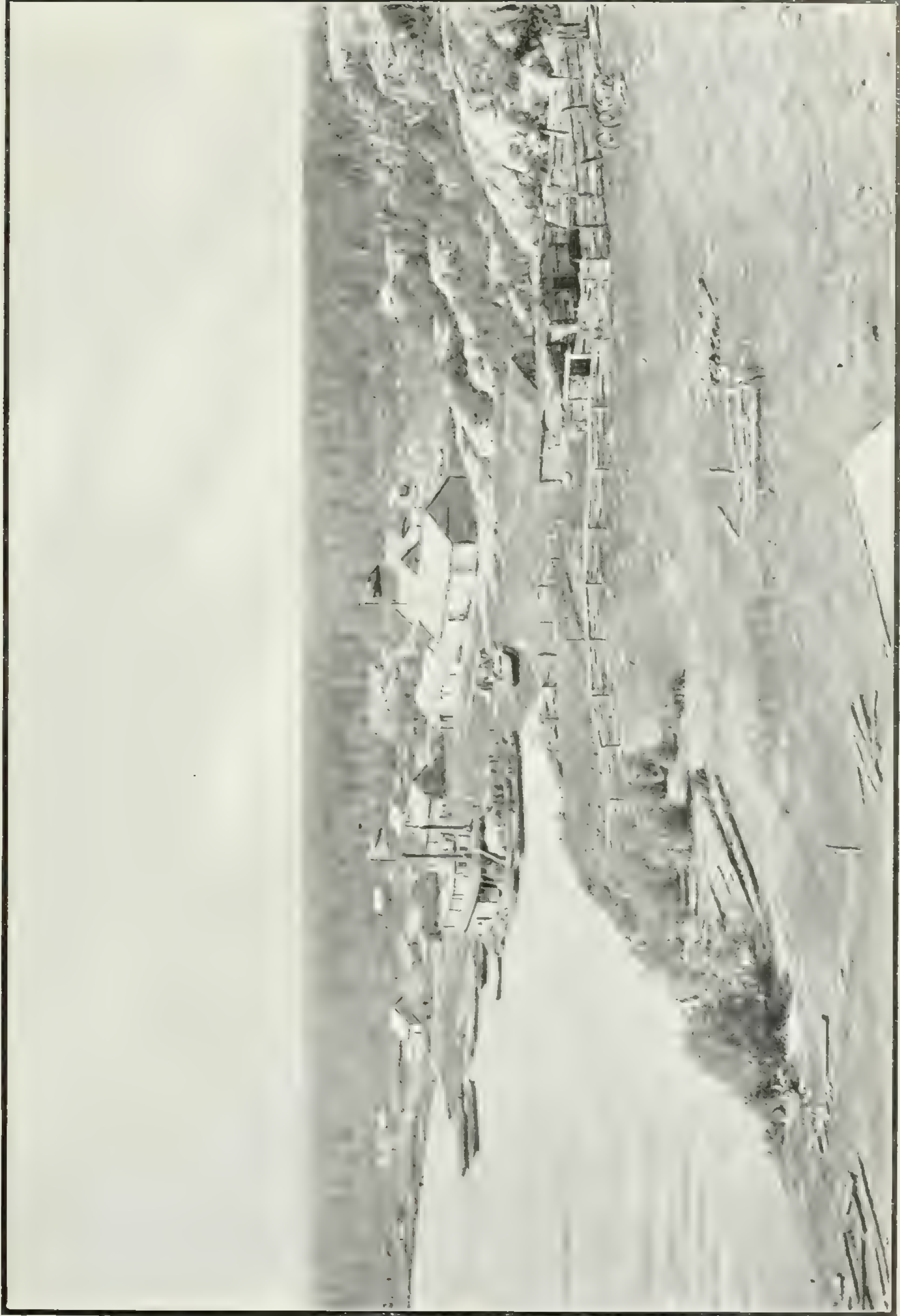


Photo by C. Engler, D.L.S.

Paying annuities to Indians at McMurry.



Photo by C. Engler, D.L.S.
The tar sands on the banks of the Athabaska river above McMurray.





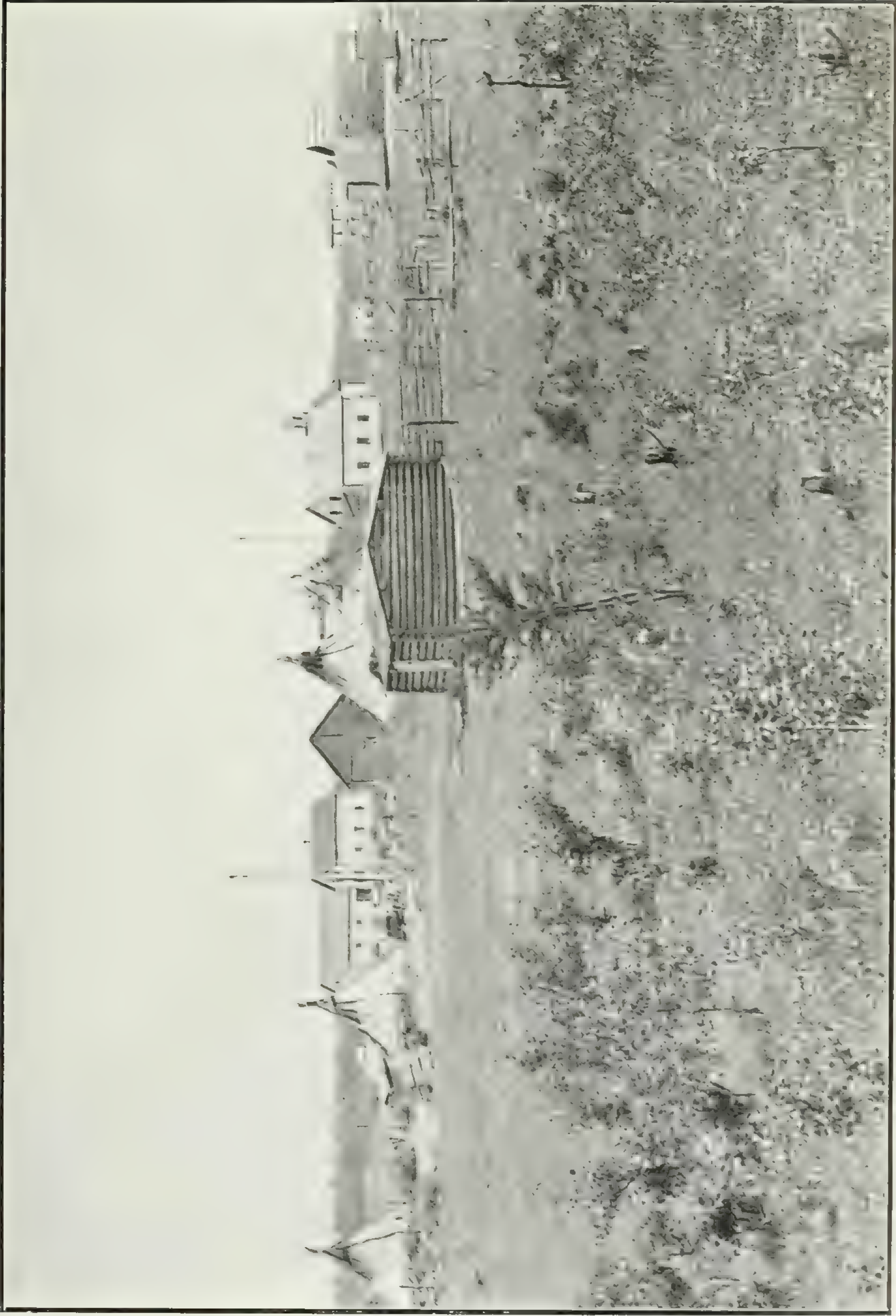


Photo by C. Engler, D. L. S.

Fort Smith.



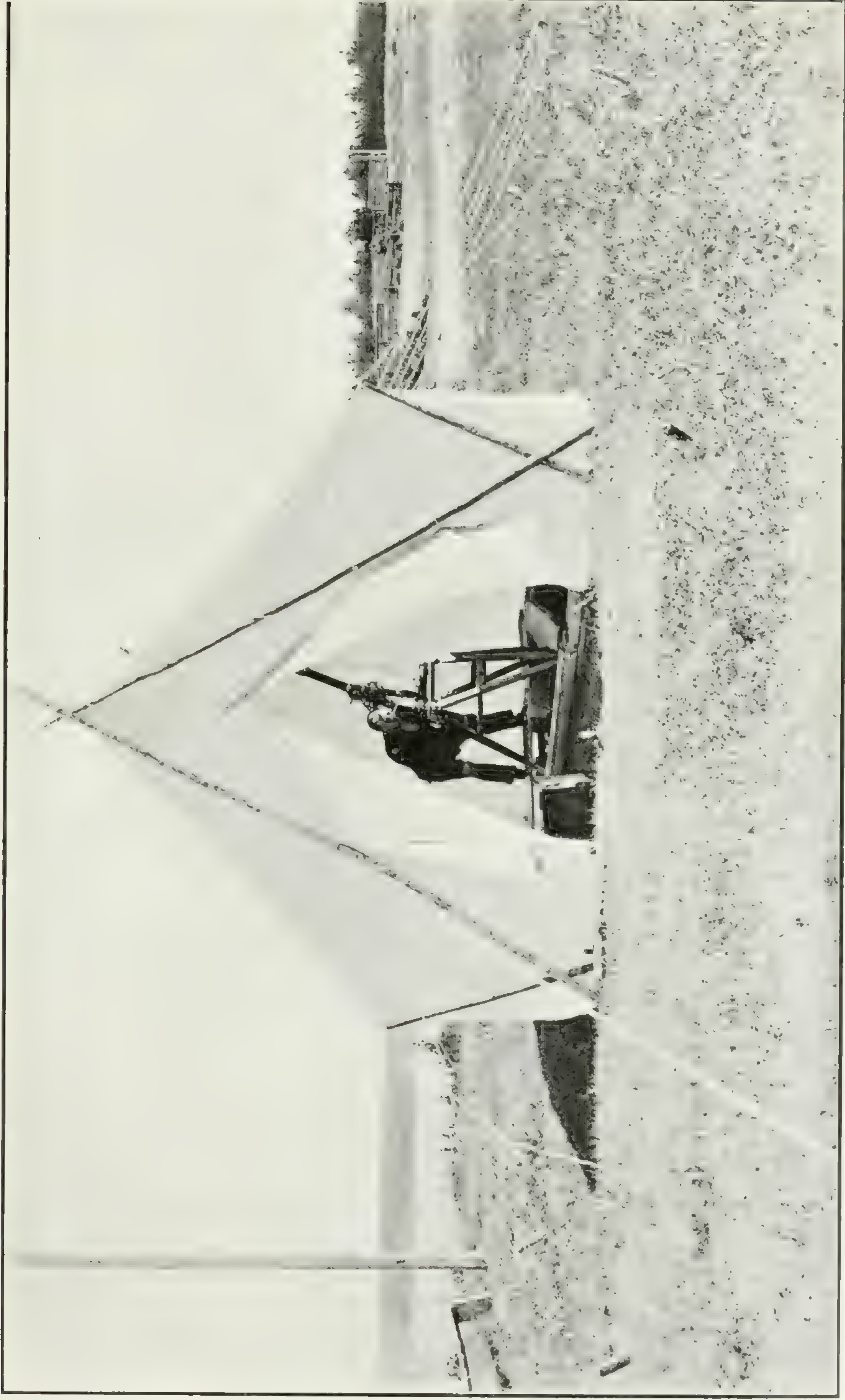
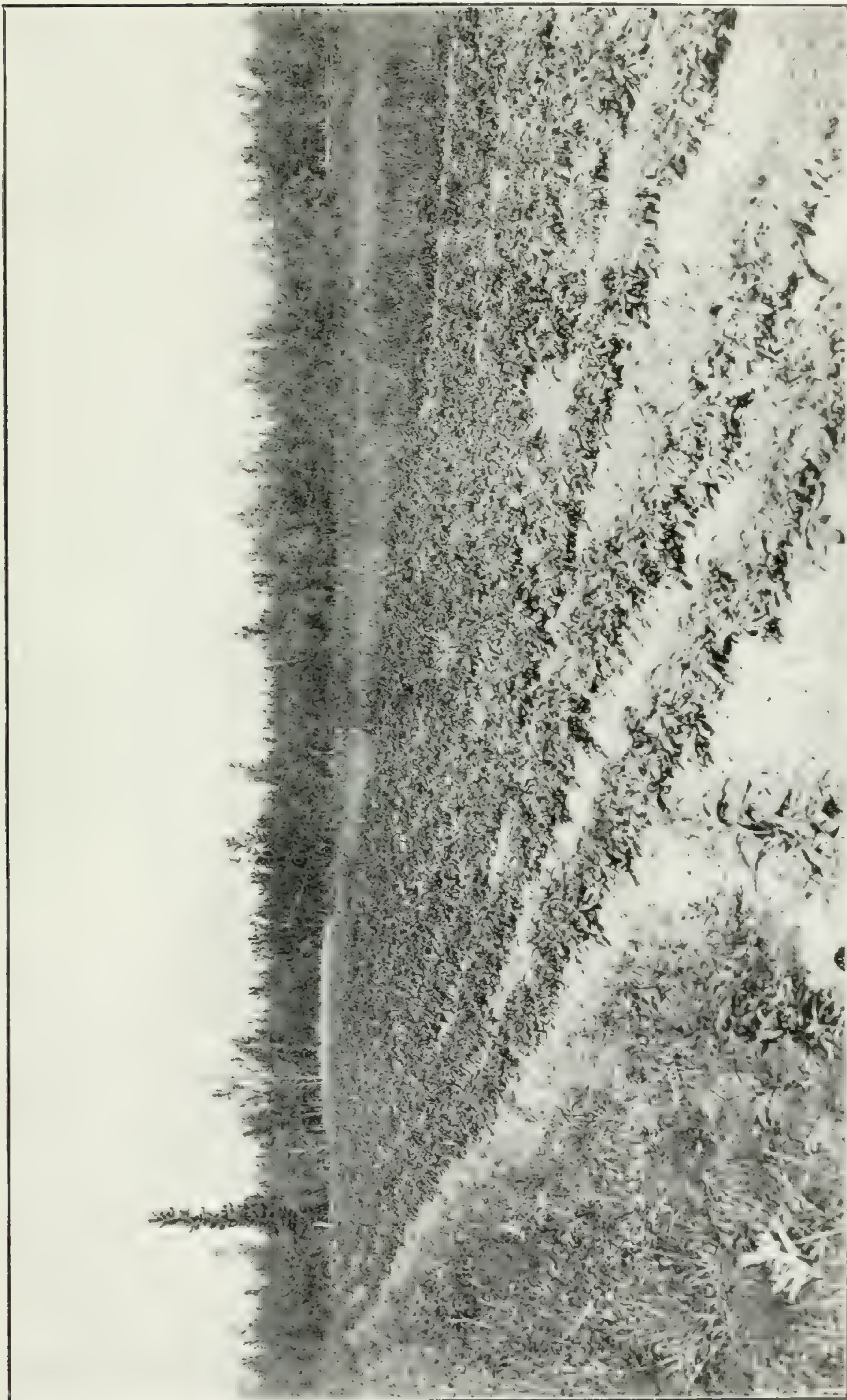


Photo by C. Engler, D. L. Z.

Observing tent at Fort Smith.





Priest's farm at Fort Smith. Potatoes in foreground. Barley and oats almost ripe in the distance. July 31, 1910.
Photo by C. Engler, D. L. S.



Photo by A. W. Ponton, D. I. N.

Ferrying across Stinking creek.



Photo by A. W. Ponton, D. L. S.

Prairie near Burnt river.



Clement Paul's ranch on Boyer river. Survey camp in foreground.

Photo by A. W. Porton, D. L. S.





Photo by A. W. Ponton, D.L.S.
Valley of Panny river—looking south



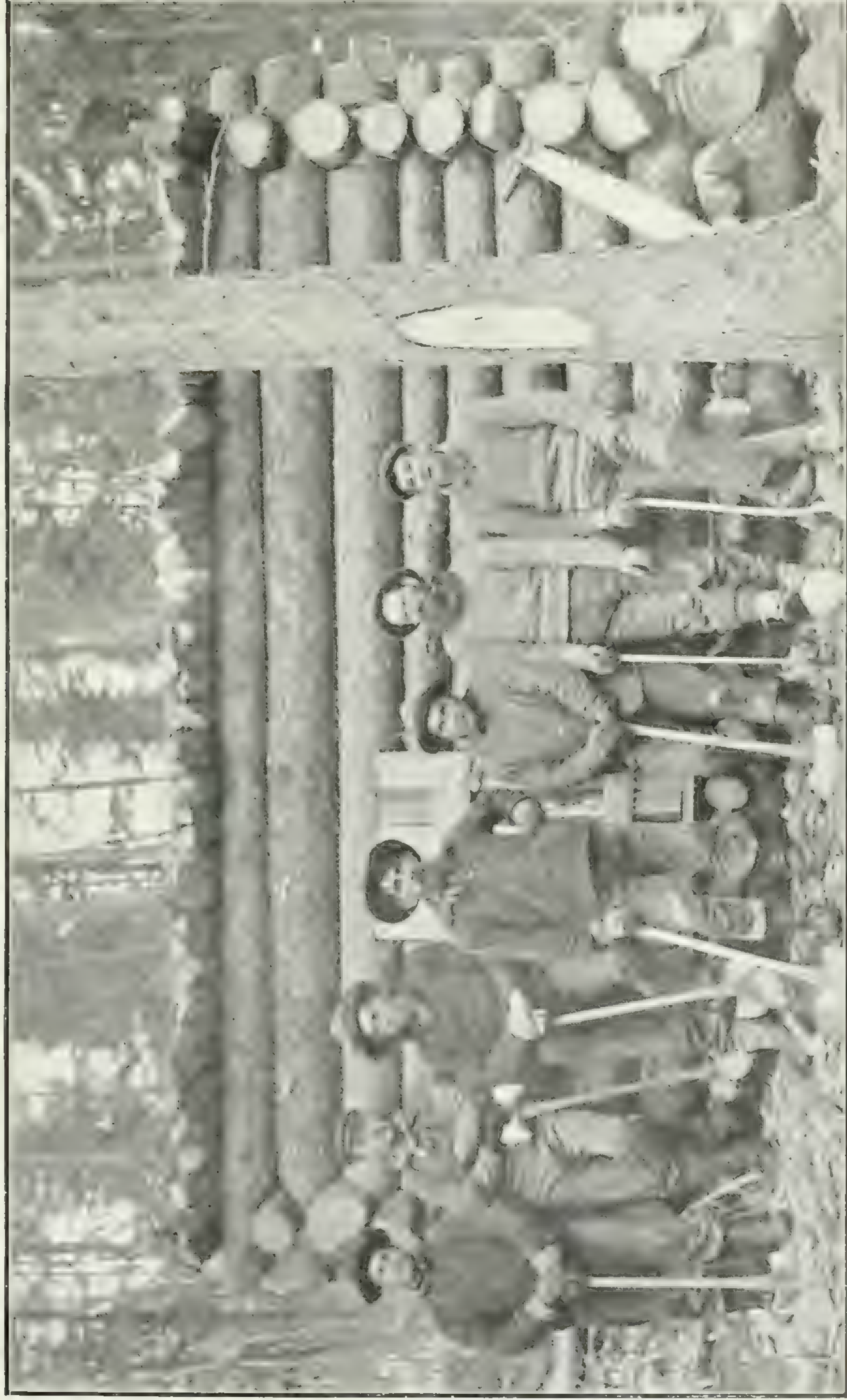
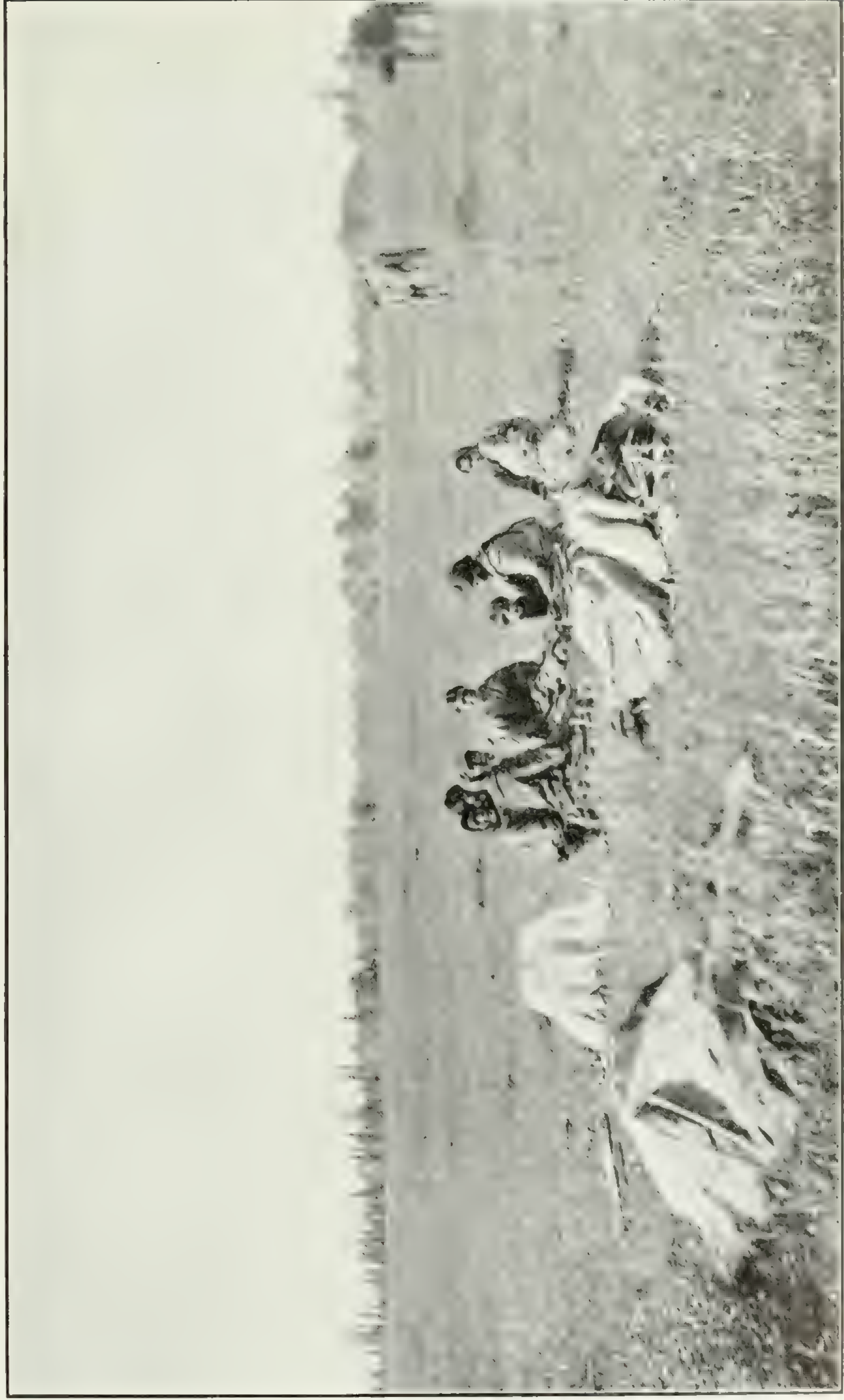


Photo by A. W. Ponton, D. L. S.

Survey cache Peace River.



Prairie country, township 108, range 13, west of 5th meridian

Photo by A. W. Ponton, D. L. S.

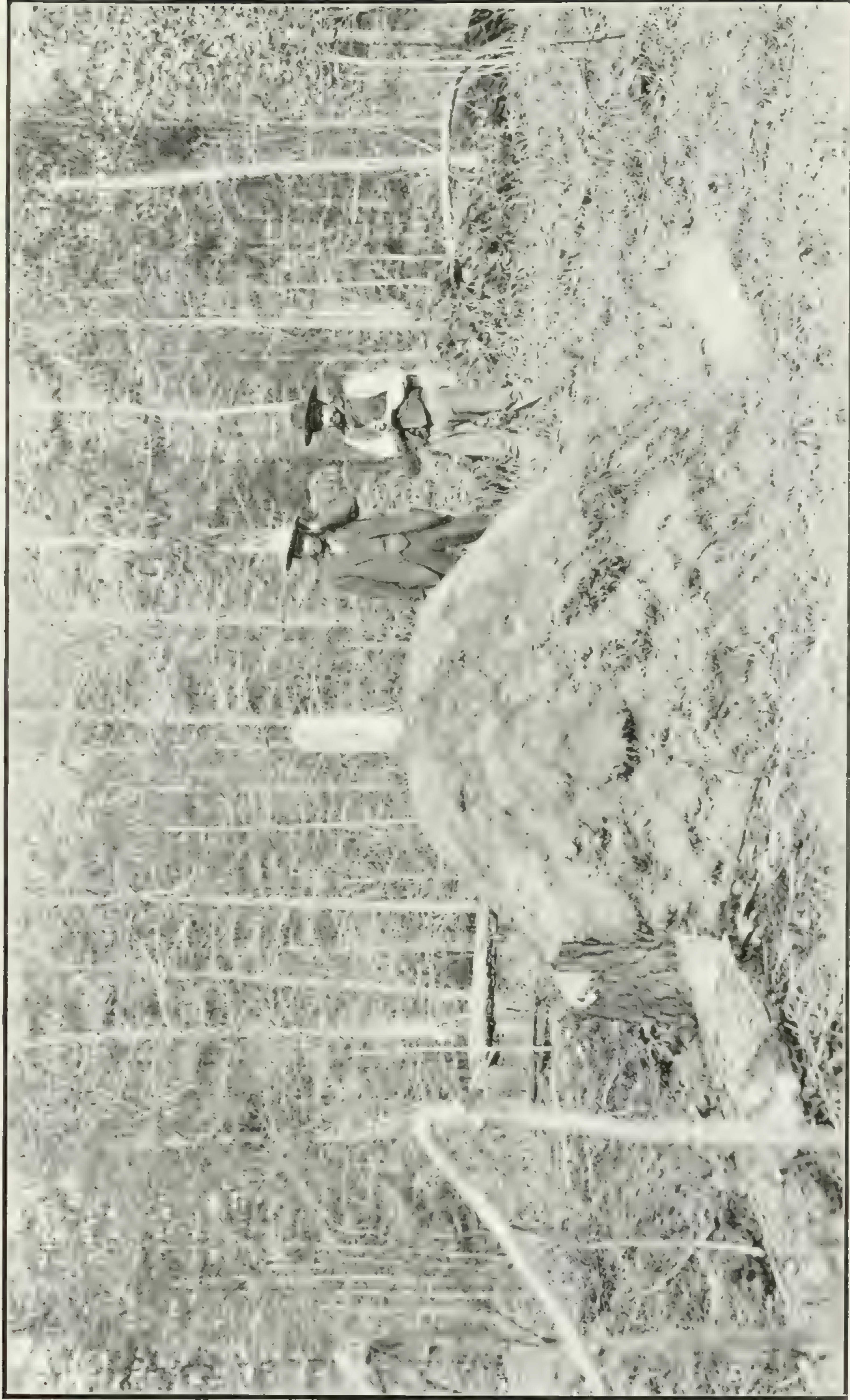


Photo by C. Engler, D. L. S.
Mound and post marking the boundary between Alberta and the Northwest Territory, on the west side of Slave river.

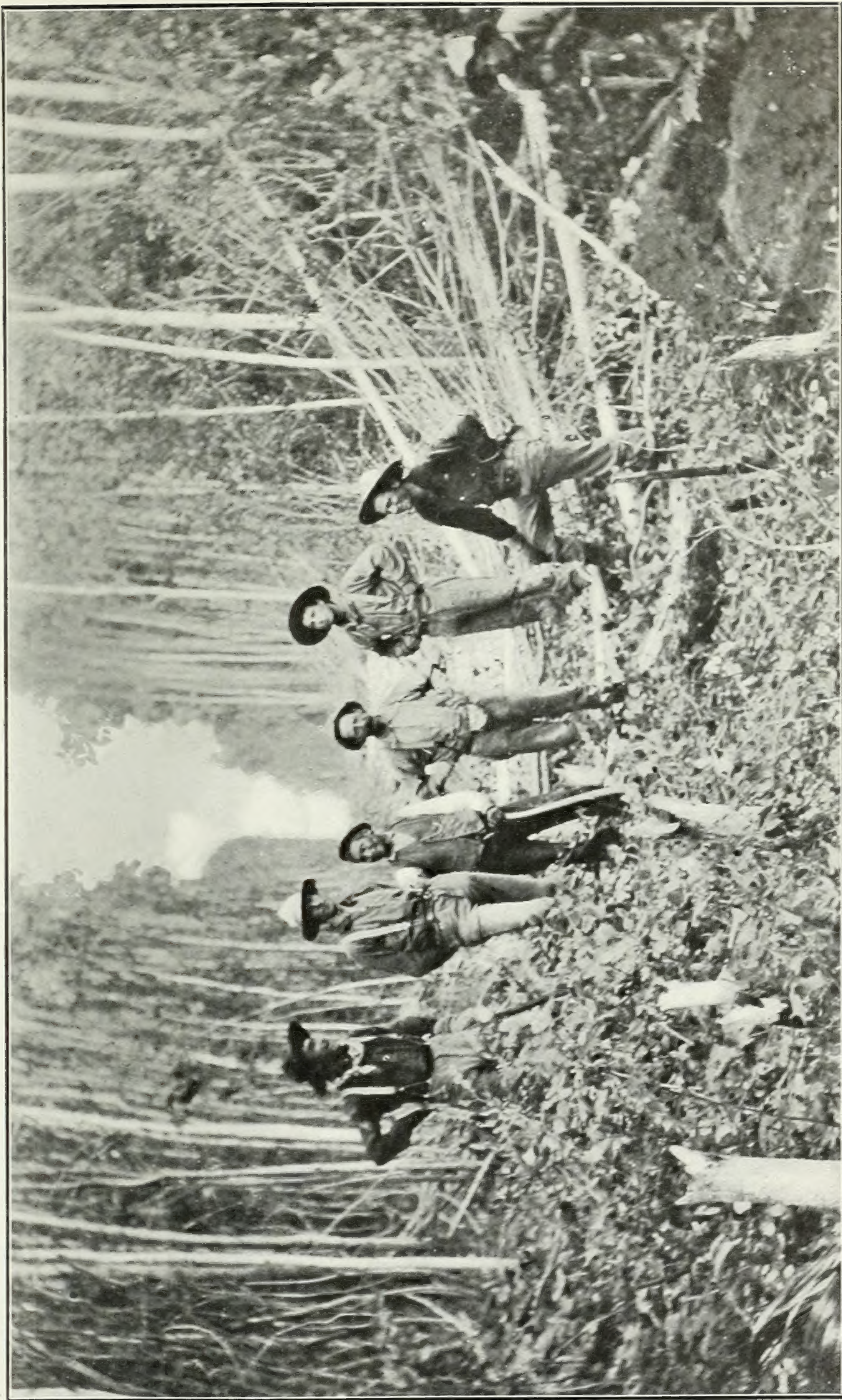
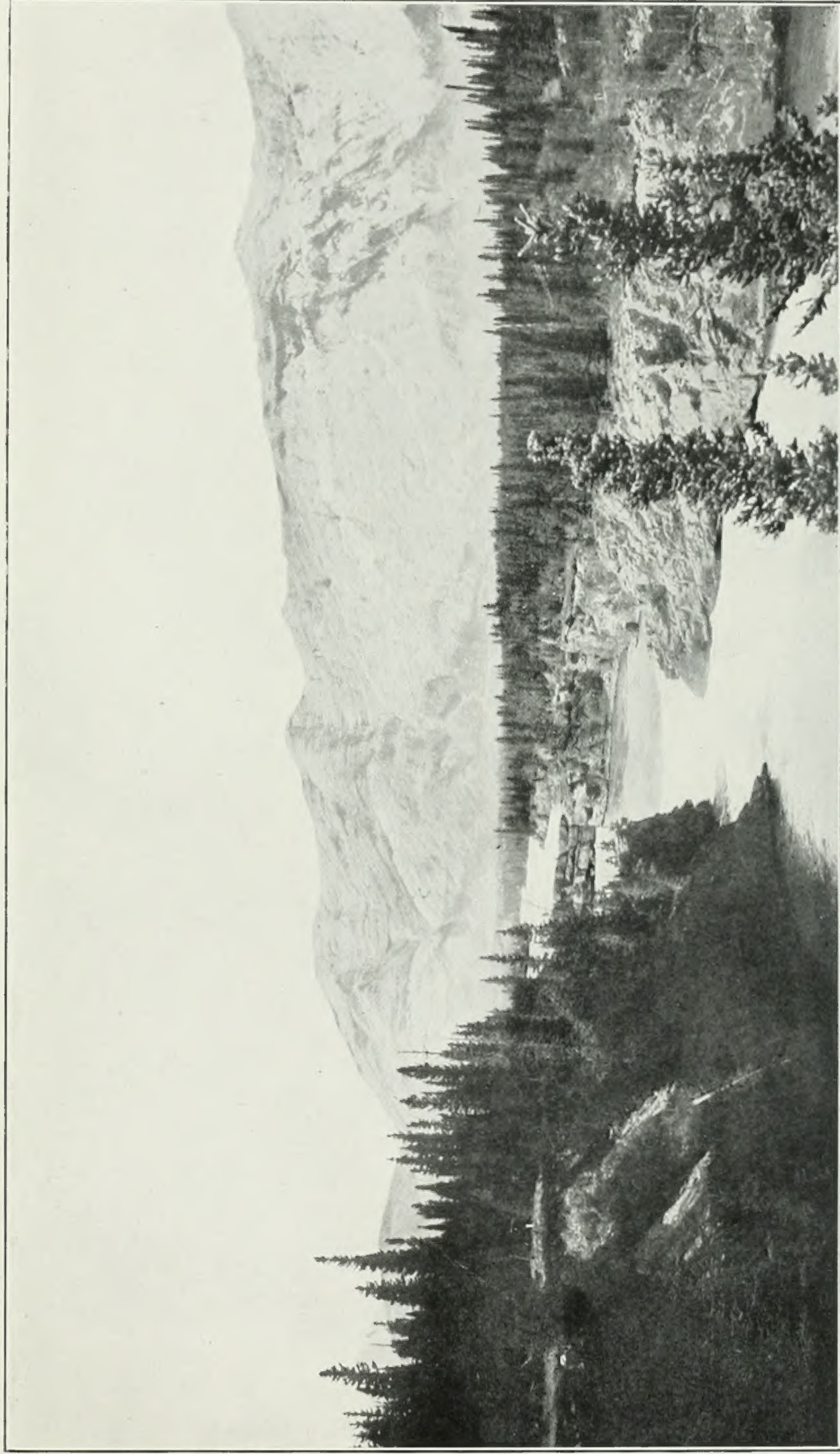


Photo by A. W. Ponton, D.L.S.

Northeast corner township 108, range 18, west of 5th Meridian—Looking east.



Kananaskis Falls on Bow River near Kananaskis, Alta. Taken by P. M. Sauder.